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APRIL 1950

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Number 4

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Contents

Cover: "Night Fire," Olympic Peninsula, Wash. *Photo by U. S. Forest Service*

Forest Fire Control — *Perry A. Thompson* — 241

Wood Requirements for Shipbuilding — *John G. Kuenzel* — 245

Germination of Eastern Redcedar Seeds — *Johnson Parker* — 255

Determining Forest Landownership and its Relation to Timber Management — *Lee M. James* — 257

Forest Ownership Research in Historical Perspective — *Henry Gilbert White* — 261

Rural Fire Protection in California — *James K. Mace* — 264

Productive Capacity of California Timberlands — *Henry J. Vaux* — 266

Five Years of Sustained-Yield Operation — *A. M. Williams, Jr.* — 269

Relation Between Soil Characteristics and Site Index of Loblolly Pine in the Coastal Plain Region of Virginia and the Carolinas — *Richard N. Gaiser* — 271

Recent Experiments in Administering and Charging for Camping and Picnicking Privileges on the National Forests — *William N. Parke* — 275

Notes — 278

Training Alaska Wildlife Workers; Planting Loblolly Pine Outside its Natural Range; Professor Champion Looks at American Forestry; Forest Pest Surveys in the Northeast; Southwestern Ranges Fifty Years Ago; Time Now for Silviculture; Mulching Seedbeds with Cellophane.

We Present—Erle Kauffman — 284

Points of View — 286

Comments on Lyle Watts' Statement in March Issue; Referendum on Federal Regulation; Federal Regulation; Regulation Snafu; Conclusions and Comments 50 Years Apart; On the State of the Society.

Reviews — 291

Forest Utilization in the Transitional Stage; Forty Years of Western Forestry; Forest Management Education in Oregon; Grasses and Legumes for Soil Conservation in the Pacific Northwest; The Western Range Livestock Industry.

Current Literature — 295

Society Affairs — 296

Forestry News — 306

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Journal of Forestry
Official Organ of the Society of American Foresters

Forest Fire Control—1949[1]

Perry A. Thompson
Regional Forester, U. S. Forest Service, San Francisco, California.

FOREST FIRE CONTROL is a broad field: prevention, control preparedness or presuppression, suppression, research, and cooperation. Every year there is change and progress in each one of these parts of the job. Time will only allow mention of a few of the more important developments of recent years in the West.

Fire Prevention

Fire control planning starts with fire prevention. Prevention itself has several facets: education of the public to care with fire; prevention through better woods practices and slash and debris handling; lightning prevention; law enforcement, etc. In recent years prevention has developed into a mature and effective program but there is yet much to be done.

In the early days of Northwest forestry, state and federal rangers and wardens did what they could to preach the gospel of fire prevention to their local people. They were literally voices crying in the wilderness. They pioneered the pattern of reaching the public by prevention news releases, posters, talks to luncheon groups and schools, use of slide-lectures, movies, exhibits, floats in parades and so on.

The exigencies of World War II, the need to conserve manpower and resources, brought about expansion and consolidation of prevention campaigns into two nationwide cooperative fire prevention campaigns as we know them today: the "Keep Green" state programs and the National Cooperative Forest Fire Prevention Campaign.

Don Belding, a Los Angeles advertising executive, suggested to the California region of the U. S. Forest Service that the war-time Advertising Council could put on a high-powered national campaign for forest fire prevention. Foresters and conservation groups approved Belding's idea. Fire prevention thus had the services of expert advertising men. Smoky Bear was born. The Forest Service and the state foresters promptly approved the national plan and thus the war-time Forest Fire Prevention Campaign was initiated in 1942. The American people gave hearty backing to this campaign and to the Northwest's "Keep Green" campaigns which had sprung up about the same time. During the war years industry of all sorts contributed millions of dollars worth of advertising to the cause of forest fire prevention. The "Keep Green" and the Cooperative Forest Fire Prevention Campaign are fine examples of how federal government, state government, industry and citizens can work together for a common cause.

The advertising group decided to continue its public service program after the war. The war-time Forest Fire Prevention Campaign became the National Cooperative Forest Fire Prevention Campaign. Similarly, the "Keep Green" programs have continued and have increased and grown stronger in influence and effectiveness under state and industry leadership.

The results of all these efforts are difficult to evaluate. These campaigns have steadily grown larger in the past eight years. For illustration, in 1942 California cooperating organizations distributed about four million pieces of fire prevention material, varying from small bookmarks to large billboard posters. This year they will distribute something like seven million pieces. Other phases of the programs have grown proportionately. The years of organized campaigning are beginning to show effect. We do not have a yardstick to measure accurately the results but the practically static record of man-caused fires in the face of an almost doubled population and use of forest areas in the West indicates that some beneficial influence is at work.

Labor, industry, educators, and most of our citizens are now awake to the need for forest and wild land protection from fire. One of the encouraging developments mentioned by Governor Langlie of Washington is the growing practice by the states of including sound fire prevention training as a part of the curricula in the grade schools and in teacher-training programs.[2] This really plants the seed in fertile soil. However, the job of prevention will never be complete. We cannot hope completely to eliminate human carelessness and "cussedness" on the part of the public, or on the part of the users of the forests, but the program pattern for continuing and concerted effort has been well established during the last few years. To sum up, we are making progress on all fronts: Researchers Schaefer and Gisborne say there are "possibilities" we may be able to prevent lightning fires in the Northwest, public awareness of its stake in forest land resources is greater than ever before, and the pattern for future efforts is pretty well established.

Preparedness

In the field of preparedness or presuppression, steady but not

[1]Presented at the annual meeting, Society of American Foresters, Seattle, Wash., October 13, 1949.

[2]Langlie, Arthur B. The Northwest way of American Forestry. Jour. Forestry. 48: 14-18, 1950.

spectacular advances have been made. Before the close of the war, David P. Godwin, whom most of you remember, was driving hard for the testing of all war-developed machines or devices that might be adapted to forest fire suppression work. There were many disappointments. A good many minor items proved adaptable. I will mention just a few, not all of them war-developed.

Four-Wheel Drives.—On many fire fronts the all-wheel drive vehicles give performance that in earlier years we associated only with pack mules. They (the jeep in particular) can go into such rough country that they have now become a cause for concern to wilderness lovers who fear the invasion of wild land areas previously accessible only by horse or afoot. They enable tankers to bring water to many sectors of fires which the conventional-drive vehicles cannot reach. This is particularly important in the protection of valley and foothill brush and grass lands of the type principally within the protection zones of the state foresters.

Helicopters.—About the close of the war at a meeting of Northwest foresters in Portland, Oregon, I stated, "The helicopter will no doubt soon enable us to deliver hot meals and possibly manpower direct to fire lines in rough country." Subsequent events proved that was a conservative statement. I shall have more to say about the helicopter later.

In many areas, in both state and national forest, the airplane has supplanted the lookout as a fire detector.

Radio.—Mobile radios have been developed to a point where they are really dependable. They are standard equipment on fire control vehicles in every up-to-date organization. The "walkie-talkie" is a valuable communications equipment for fire-fighting line executives. Its range is limited but it enables the fire chief to talk with his line bosses.

Water Equipment.—We have learned a lot about how to use water on fires. Our earlier use of water was wasteful. Waste is unimportant when the source of water supply is a free-flowing stream or a lake. It becomes of first importance when the water must be hauled long miles in a tank truck, packed on the backs of animals or men, or transported by air. Under the old practices at least fifty percent of the water expended served no useful purpose. Recent developments in the fog-nozzle-high-pressure field and in redesign of low-pressure pump equipment to provide more positive control of expended volume and character of the discharge are very encouraging. Bigger and better tankers, water carrying tractors, better hose are all to be had.

Bulldozers.—We have learned much about bulldozer use, principally the fact that tractor use and manpower use must be very closely correlated else effort will be wasted. The bulldozer will continue as the work-horse of the fire lines but we will not get maximum production from it until we train men to direct its use on the fire line. A good "cat-boss" can direct from one to four cats and double the satisfactory line output.

In addition to the major items mentioned many small items have been developed and are in general use. Numerous other items have been tested and discarded.

Aerial Bombs.—The experimental work with aerial bombing of fires in Florida and in Montana conducted in cooperation with the Army Air Forces established the fact that fires could be checked by aerial bombing but that the cost was so great that no forest fire control organization could afford it as a purely fire control undertaking. Here research gave a negative answer, but a sound one.

Organization.—Organization and direction of the fire crew always was one of our weak points.

It is axiomatic that in fire suppression practice as in most other activities our knowledge of what to do is, and always has been, far ahead of our application of this knowledge. This is more than ever true as regards the use of modern equipment. On the large western project fire we are still inclined to think in terms of manual message relaying, walking crews miles to the line, the use of foot scouts, the limitations of two-wheel-drive vehicles, hand line digging, and fire camps at waterholes or at road bases frequently miles from the fire front. Our mental processes just have not caught up with the potential speed of action attainable by some of the newer equipment such as those discussed. The developments of the past five years make it imperative that our thinking, planning, and organization practices rise to the tempo with which these modern machines can function. To mention just a few: We must learn to think and plan in terms of work camps *on the fire line* with light or dispensable mess equipment and bedding; of hot food and water flown in to the camps or direct to the crews by plane or helicopter. Fire bosses must learn to think in terms of reconnaissance by helicopter. They can cover several miles of line in a few minutes, making quick on-the-spot appraisals, directing forces through use of mobile radio, talking directly to the scouts, the sector bosses in charge of lines, and the men in charge of machines, and, when necessary, shifting overhead and work forces from point to point by helicopter. All these things are being done on big fires. They all contribute to better management, reduce losses and costs. All aid speed-up control.

Fire Control Cooperation

Appropriations under the Clarke-McNary Act have been increased in recent years until they reached the authorized figure of nine million dollars. This amount was estimated "adequate" in the days before the purchasing power of the dollar began its decline. A recent increase in this authorization to twenty million dollars redeems in fact the intent of the origizal commitment. To me this action indicates development of increased national interest in and a satisfactory sense of public responsibility for adequate protection of timber stands in state and private ownership, which are and must continue to be the bul-

wark of our national-security-resource in timber products.

The most outstanding recent development in protection cooperation is the effort initiated in the New England States to obtain authority to cross state boundary lines and incur expense to aid each other in fire emergencies. It took the Maine catastrophe to arouse the people of those states to the need for coordinated action.

Last fall in southern California a substantial number of the residents of Ojai had to be evacuated because of a forest fire which burned into the city limits; also, when fire threatened the little town of Silverado, all except the male inhabitants were evacuated. In neither of these places was there a pre-planned scheme for such evacuation nor well-knitted plans for joint action between municipal, county, state, and federal forces. Following these experiences, cities and counties in southern California, notably Santa Barbara and the towns in the Los Angeles area, started planning on the problem of evacuations. The benefits from cooperation and advance planning pay off big in the fire control field.

Fire Suppression

Fire suppression is the final test of our plans, our equipment, our training work, our men. Probably the most important changes in fire suppression practice of recent years are those that have increased the use and effectiveness of air transportation, all-wheel drive vehicles, bulldozers (both heavy and light weight), tractors and plow units, use of water, and lightweight radios. This equipment has a great capacity for increasing the speed of control planning and the speed of attack; for increasing the mobility of forces and for maintaining working forces *on the fire line* night and day and for reducing the fatigue factor. All this means more held line, and faster.

To cash in fully on the capability of these new resources we must develop new planning practices, revamp line organization, replan logistics, and line crew management. The fire boss of today no longer need be dependent upon second-hand advice and delayed information from foot scouts. In a matter of minutes he can, by a helicopter trip, "see for himself." By virtue of a quick look at long stretches of line he can make immediate plans for realignment of forces. He can put these plans into execution by radio communication and helicopter transportation. The men can be shifted in rough terrain without strength-sapping time-consuming hikes. Only an open spot on a ridge is needed for helicopter landings.

A few examples of what has been done on some recent big fires will be of interest. I have details on what happened in my own region only. No doubt others too have had like experiences. On the Bryant fire in the Angeles Forest, 80 fresh men were placed on one division by helicopter in $3\frac{1}{2}$ minutes per man as against $3\frac{1}{2}$ hours hard uphill hiking. The first 60 men of the crew were fresh and active on the job in $3\frac{1}{2}$ hours as compared to having the whole worn-out crew arrive in $3\frac{1}{2}$ hours. Active work on the line started within four minutes after the first man, the sector boss, took off and the work stepped up progressively from then on. Absence of fatigue and resulting high morale paid off in the form of at least double the average rate of line construction. This crew was based on the line for $1\frac{1}{2}$ days and subsisted with hot meals, lunches, and water transported from the base camp by helicopter. The men finished their assignment in a cheerful mood and came off the mountain by air.

A truck tipped over; 25 men were injured, 3 seriously. It was two hours by truck to the nearest doctor or hospital; but the helicopter had the last of the seriously injured men in the hands of a doctor 45 minutes after the accident was reported. The landing spot was on an outcurve on a 9-foot truck trail.

On the Ojai fire a fleet of five helicopters was used one day to transport hot-spotting crews to critical points on several miles of un-worked line, for carrying water and food to men, and gasoline and oil to tractors, for reconnaissance by the fire boss and for shifting labor and overhead between critical points. This was the day that the first weather "break" came. Had it not been for the speed and flexibility of helicopter service it is doubtful that men could have reached critical spots in time to check and hold them. On this fire also, crews placed by helicopter were subsisted for two days by the same means.

On the Queen Bee fire, Los Padres Forest, in August of this year a helicopter was ordered along with line crews which would arrive about 6 P.M. The helicopter arrived in time to permit the fire boss and sector bosses to make full reconnaissance before dark. Thus they were able to determine definitely just where bulldozers could be used and where manpower and hand tools were needed. With this information at hand, equipment and crews were dispatched with surety and an 800-acre fire corralled during the first night.

I am told that in the Lake States, the middle West and the South, three-to-five-man crews, equipped with light tractor-plow units, rapid firing torches and good water equipment, now control fires of several hundred acres with astonishing rapidity and assurance.

Smoke Jumpers

The smoke jumper program has been an effective way of speeding attack on remote-country fires. There may be a few large areas where that spectacular and thrilling-to-watch method may still be the most practicable and economical way to "hit 'em quick and hard." Nevertheless, I predict that within five years or less helicopter transportation will take over most of the job now being done by the smoke jumpers. I shall regret the closing of this chapter of fire suppression effort. To me it will always stand a monument to the courage, daring, determination and resourcefulness of the men who carry on the strenuous and often dangerous job of fighting forest fires.

Manpower

Tools and machines are only as good as the men who use them. In the fire suppression field, as in the military, we are depending more and more on equipment, gadgets, and machines. The man with the axe and shovel, like the infantryman with his rifle, nowadays makes up a much smaller percentage of the total fighting force. But in the roughest sectors where the going is often the toughest, and in the final stages of a suppression job, we must still depend on the man with the axe and shovel. Nor is this situation apt to change.

As time goes on, however, it seems that fewer and fewer young men have the opportunity or need to become skilled in the use of those old standby tools, the axe and shovel. Every modern youth can push or pull a throttle and handle the most complicated set of controls with the greatest of ease, but an old-fashioned, skilled laborer is hard to find. This puts a premium on the training of fire suppression crews.

The trend in presuppression forces is, I believe, towards the practice of the greatest possible speed of attack with relatively small crews, superbly equipped and trained for their jobs. This sort of first attack organization requires more initial outlay but it will surely result in fewer large "project" fires, losses will be smaller, and emergency costs should be reduced. The fire suppression manager's job is to make the budget people on his "board of directors" realize these facts and put up the money to finance such an organization.

Research

Forest fire control research has for years been most inadequately financed. A small experienced group of men in state and federal organizations have been carrying on in spite of great difficulties. They can report good progress along several lines. I'll mention just a few:

1. Development of chemical soil sterilization treatments for firebreaks and roadsides.
2. Development of better techniques in the use of water, coupled with a study of wetting agents.
3. A study of efficiency of various types of nozzles, including fog nozzles, and establishment of guide lines to aid a user in making choice of type. (The University of Southern California contributed to this project.)
4. Improved fire danger meters.
5. Good progress is being made on fire behavior studies and on fire damage studies.

Several equipment development centers and projects have been established. They have accomplished real results in the field of improved tanker design, development of light tractors, trenching machines and fire line plows, as well as numerous smaller pieces of equipment and tools.

Arthur Brown, former chief of the Division of Fire Control, U. S. Forest Service, has now been given the job of reorganizing and revitalizing fire control research in the Forest Service. He has had broad experience in all phases of fire control work. I look for accelerated progress under his leadership.

Threat to Adequacy of Control

I've talked so far about the helpful developments. As an old-timer with battle scars, I want to say a word about a development of the past five years that gives me real concern.

When a conflagration gets under way we *must* put out the fire. We cannot always count the cost. To cash in on preparedness we must have force enough, fast enough, and skilled enough in doing what has to be done to do the job. This means *trained men* and modern equipment suited to the job.

From what I read, I judge our top-flight statesmen are doing positive things on an international basis in the fields of war-prevention, preparedness for war, and plans for action if war comes. I wonder many times if these men are paying enough attention to the wood-supply phase of *our own* logistic problems—to the *protection* of forest land resources.

I express this concern sincerely and earnestly because, basically, an adequate fire control outfit *must* have the trained fire control administrators and suppression crews of proper strength plus good equipment, all at strategic locations. Trends of the past several years in the field of social economics, and public finance, with resultant 40-hour weeks, overtime, and wage and salary increases, without compensating increases in appropriations, have raised havoc with many protection organizations. Almost every fire control organization has been weakened by the higher costs of doing business.

Every man with responsibility for managing or protecting a forest property in the West knows that the resources of the forest and wild lands of the West—timber, water, grass, wildlife, recreation—are now in strong demand and that they will continue in strong demand. Local economy is built around them in much of the West. Continued economic well-being of the West depends upon them! So, when I see the economy axe applied to state or federal appropriations for forest fire control work, while appropriations for programs of the "gimmie" kinds, admittedly many of them with stronger voter appeal, are increased by huge amounts, I cannot escape the conviction that our society has a job and a responsibility to assist administrators in getting adequate financial support for this important phase of the foresters' work.

The forests are a part of our security resources. We can't afford to let them burn. The philosophy of "force enough, fast enough" is still necessary to protect and sustain our forests, national and private, and our nation.

We have made steady progress in recent years. We shall undoubtedly keep up the pace in future.

Whether we get adequate financial support or not, whether we get better machines or not, of one thing I am certain: the foresters of tomorrow, like those of today and yesterday, will tackle their tough and dangerous job of protecting our forest and wild lands with characteristic determination, devotion and courage.

Wood Requirements for Shipbuilding

John G. Kuenzel[1]
Senior Materials Engineer (Forest Products) Research Division, Bureau of Ships, Navy Department, Washington, D. C.

The subject of wood requirements for shipbuilding includes uses, the origin of which are as old as man's dominion over the sea and as new as modern atomic warfare. A certain humility is felt in attempting to present all that the title of this paper implies. Any one who has viewed the vast quantities of choice lumber, timber, plywood and other wood products stocked at naval shipyards during the period 1941 to 1945 and has observed the exacting requirements of their fabrication into boat and ship members, cannot but be impressed as to the contribution made by these materials to the sea power of the United States.

Steel and wood rank as the two principal structural materials used for building and maintaining the modern fleet; approximately 8,858,000 tons of steel were required by the Navy during a twelve-month period of 1944. Wood requirements for a similar twelve-month period were approximately 2,971,000 tons, rating this material first in volume and second in tonnage of raw materials needed for all types of naval military construction, afloat and ashore. Despite the general belief that the development of iron ships subsequent to the War between the States rendered wood almost obsolete for shipbuilding, it continues to serve many important shipbuilding needs. Wood is our only replaceable structural material, and its uses in certain non-metallic (non-magnetic) structural applications are highly important to the fleet.

In a limited way, it is possible to outline briefly the principal marine uses of wood in the design, construction, and maintenance of naval vessels. Some of these applications are included in numerous detail plans, and specifications drawn up by naval architects and engineers list in detail the species and grades required for each structural part of every type of wooden vessel.

The lumber used in marine construction can be classed in three types: (a) utility lumber, (b) structural timber and (c) special boat and shipbuilding lumber. The first type consists essentially of construction or yard lumber generally stocked in grades of No. 1 Common and Better in hardwoods and No. 3 Common and Better in softwoods. Due to differences in methods of grading the remaining two types and the character of defects allowed in each, the quality requirements must be arrived at by different applications of certain basic principles. Boat and shipbuilding lumber is usually stocked in the highest grades and largest sizes available and therefore presents the greatest problem from the standpoint of available supply. The dependence of shipwrights on top grades and large sizes of choice domestic and foreign species is traditional. The type of construction used to withstand destructive forces and organisms of the sea differ greatly from the design requirements necessary to withstand forces encountered on land or in the air.

The principal woods used by the Navy on the basis of quantity required are Douglas-fir, southern pine and other softwoods, white oak and other hardwoods, in the order named. Other softwoods include cedar (southern white, Port Orford, Alaska, western red), cypress, hemlock, larch (tamarack), pine (white, sugar, ponderosa, red, lodgepole), redwood, spruce (Sitka, Englemann, white). Other hardwoods include ash, balsa, basswood, beech, birch, cherry, cottonwood, elm, hickory, ironback, lignum vitae, mahogany, maple, teak and yellow poplar.

Considering shipbuilding needs alone, white oak ranks second in volume required. Many of the uses for these woods have been evolved through many years of experience in shipbuilding. Practices involving frame and futtock construction which flourished during the days of the sailing vessels are still found applicable in construction of certain modern wooden vessels. Live oak stands were considered sufficiently important to our early national defense to be reserved by a naval appropriation in 1827 as this country's first organized timber conservation measure. Some of the logs cut from these reserves between 1845 and 1860 and stored under water are being used in the repair of the *USS Constitution* at Boston Naval Shipyard in 1950. Because the timbers of tremendous size cut from old growth trees are not always available in the quantities and grades required from eastern and southern forests, the shipwright's choice for building materials has gradually shifted to species of suitable properties found in old growth and large sizes in the Pacific Northwest, Alaska, and tropical America. Alternate species are constantly being tested at naval shipyard material laboratories in order that scarce boat building woods may be readily replaced. As a result, the Navy lumber catalog presently lists most of the commercial species produced in the United States, together with many foreign woods. These species are procured under grading rules of the various lumber associations, or, in the case of species not covered by commercial grading rules, Navy specifications describing the sizes and grades required are used as a basis for procurement.

Pattern, Templet and Model Lumber

Woods used for patterns, templets and ship models are important to the Navy, since these materials have a very important place in the building of naval vessels. The making of scale models in wood is normally a preliminary step in the design and testing of all classes of naval vessels. In some types involving departures from conventional hull design a towing model is constructed to determine resistance of vessel. Plating models are made to exact lines and used in laying out shell plating members. Exhibition models are made predominantly of carefully fitted wood parts. Every part of a ship—the

[1]The views expressed by the author are not to be construed as representing those of the Navy Department.

equipment and ordnance that is a casting of iron, steel, brass, aluminum or special alloys—must first be produced in wood or other materials by the patternmaker. A first class patternmaker is an expert draftsman, wood worker and foundry man. As he transposes a blue print drawing into a built-up wood model of exact dimensions, a battleship is started. Patterns are made of the bow and stern post, which are built into the keel to form the backbone of the ship. As the hull develops, sea chests are built, which will connect the hull to the various pipelines that go to the pumps, condensers, water and ballast tanks. All special pipe fittings are first patterned—the hawser pipes, the wild cats, and machinery to raise and lower the anchor. The engines that drive and steer the ship require patterns, as do the stern tubes which hold the propeller shaft. Each fitting and fixture above and below deck that is a casting must first be formed in wood—valves and pumps, water tight doors and frames, ventilating equipment, companion ways, refrigeration—the propeller for the battleship and for the captain's gig. Following the initial casting, wood patterns and templets are stored for reuse. All patterns used in construction of naval vessels must be retained for the life of the ship. During this period of storage the patterns must maintain their exact original dimensions, in order that a replacement casting will be a perfect counterpart of the original.

White pine, either from the eastern *Pinus strobus*, the Idaho *Pinus monticola* or the California *Pinus lambertiana* species is the most commonly used pattern wood. The soft even texture and uniform cellular composition, the firm yet workable quality, and ability to hold shape and remain in place makes white pine one of the principal woods chosen by skilled patternmakers. California redwood (*Sequoia sempervirens*) possesses similar desirable properties for some uses and is available in large sizes of clear material. The grades of these species purchased for pattern use range from the highest type of selects, down to the better knotty commons which may serve to build up a large machine base or a special mold for a new design plastic boat.

Mahogany, including Honduras wood of the genus *Swietenia*, African *Khaya*, and Philippine *Tangile*, possesses excellent dimensional stability and uniform texture for use in intricate and frail models and patterns. Grades of Firsts and Seconds, including pin wormy and shorts, and No. 1 Common Wormy are stocked. Cherry lumber in grades from Selects through No. 1 Common are the choice of patternmakers at the David Taylor Model Basin where intricate ship designs are modeled. Plywood of Douglas-fir, mahogany, and other species is used for templets in shaping lines for hull and other details in construction of standard Navy boats. In addition, white pine, noble fir, Sitka spruce of pattern grades and basswood of select grades are used. Tests have been conducted on the properties of Alaska yellow cedar which indicate that it possesses properties sufficiently similar to mahogany to justify its use for a better type of patterns requiring high grade lumber with great dimensional stability and uniform texture. The species, grade and size of pattern, templet and model stocks of lumber vary with the individual requirements for each shop use. The method of utilizing lumber in a pattern shop differs from that employed in working up stock in applications where all surfaces are exposed and only the clear pieces can be used. By proper cutting and arrangement some built up patterns can admit small sound defects and even larger ones in such a manner that they will be covered in the completed form. By this practice the usable portion of certain intermediate lumber grades may be noticeably increased. There is at the present time a definite shortage of the quality grades of pattern lumber. Proper utilization of suitable available grades without reducing pattern quality or speed of assembly presents a challenge to all concerned in providing for continuing supplies of these special wood products.

Stage and Scaffold Planking

Enormous quantities of structural timbers are required in the form of stage and scaffold planks which as the name implies are a part of the temporary structure in and about a ship during construction or repair work. Stage planking is required to support the shipwrights and their tools and materials at a convenient working level. It also provides walk-ways alongside in the construction of naval vessels and other installations. Wood has no competitors as a stage and scaffold planking material. A requirement of this material is that sufficient strength must be provided to carry any reasonable load safely. It is also essential that the weight of the planks be no more than can be readily handled by two workmen since it is customary to shift the planks to an adjacent location by hand. The cost of the material in terms of purchase price and expected service life is a further consideration. In order to obtain the advantages of a competitive market, it is customary to allow a choice of species (a practice that is followed whenever possible in Navy lumber procurement). A factor of geographical supply sources must also be considered, as lumber contractors from various producing areas demand the right to bid on products from these areas. With all these structural and economic requirements properly weighed: strength for safety and service, weight which can be handled by man-power, costs as determined by competitive bidding and the sectional demands of suppliers, experience has developed specifications for this material, as listed in Table I.

From the loads indicated it is evident that variation exists among the several species listed, and that the plank may not normally be used in spans as great as 22 feet without use of intermediate supports to shorten the span lengths. The loads indicated would be inversely proportional to spans. Thus, changing the span to 11 feet would double the load indicated for spans of 22-feet. The 2-inch by 12-inch by 16-foot span load is inversely proportional to the 2-inch

Table 1.—Stage and Scaffold Plank—Characteristics as to Size, Weight and Strength

Navy Lumber Catalog Stock No.[5]	Size: Thickness in.	Size: Width in.	Size: Length ft.	Species and unit fiber stress value	Plank wt. lbs.	Max allowable safe load—lbs.[4]: Distrib. over length	Max allowable safe load—lbs.[4]: At center of plank
39-L 4796.300	2	12	16	Southern Pine 2000 f.[1]	96	420	210
				Douglas-fir 1900 f.[2]	90	400	200
				Sitka Spruce 1500 f.[3]	75	315	156
310	2	12	16 to 28, avg. 22	Southern Pine 2000 f.[1]	132	306	153
				Douglas-fir 1900 f.[2]	125	291	145
				Sitka Spruce 1500 f.[3]	102	230	115
312	2	14	16 to 28, avg. 22	Southern Pine 2000 f.[1]	156	359	180
				Douglas-fir 1900 f.[2]	146	341	170
				Sitka Spruce 1500 f.[3]	119	270	135
315	2½	12	16 to 28, avg. 22	Southern Pine 2000 f.[1]	165	523	262
				Douglas-fir 1900 f.[2]	156	497	248
				Sitka Spruce 1500 f.[3]	128	392	196
317	2½	12	20	Southern Pine 2000 f.[1]	150	575	287
				Douglas-fir 1900 f.[2]	142	551	275
				Sitka Spruce 1500 f.[3]	117	435	217
320	3	12	20 to 28, avg. 22	Southern Pine 2000 f.[1]	216	800	400
				Douglas-fir 1900 f.[2]	204	760	380
				Sitka Spruce 1500 f.[3]	168	600	300

[1]Prime Structural LL (2000 f), Para. 392, dense structural Southern Pine (2000 f), Para. 314 (1948 Edition Standard Grading Rules for Southern Pine Lumber).

[2]1900 f Scaffold Plank, WCLA Para. 315 (1947 Edition of Standard Grading Rules, West Coast Lumbermen's Association).

[3]1500 f Scaffold Plank, WCLA Para. 898 (1947 Edition of Standard Grading Rules, West Coast Lumbermen's Association).

[4]Safe Load on Scaffold laid flat based on support at ends only and clear span of 16' for stock item #300, Avg. 22' for stock items #310, #312, #315, #320, and 20' for stock item #317.

[5]As listed in the January 1949 General Stores Section, Catalog of Navy Material, Class 39, Lumber, Table 20.

by 12-inch by 22-foot span load.

The loads indicated are directly proportional to stress value. The 1900f stress grade will bear a load 19/20 or 95 percent of that for the 2000f stress grade, and 1500f stress grades allow a load of 15/20 or 75 percent of that for the 2000f stress grade. These stress values are for normal loading conditions. Thus, on the basis of a 7-day continuous use basis, the allowable loads listed in Table 1 could be increased 25 percent with safety, in accordance with allowable adjustments for duration of load.[2] Due to presence of dense resinous summer wood in the allowable scaffold plank grades of southern pine, some shipyards have objected to the excessive slipperiness of this material when wet. However, this is not substantiated by general experience and since only a limited quantity of high grade southern pine and Douglas-fir stage and scaffold plank is produced, eliminating southern pine source of supply creates increased demand for Douglas-fir with resulting eventual lowered quality in the latter species.

Some difficulties have recently been encountered in obtaining adequate supplies of stage and scaffold plank and consideration has been given in a preliminary way to developing specifications for a laminated product from suitable lumber grades of species having required strength for this exacting use. Honey-comb and sandwich type assemblies may also be adapted to special stage and scaffold needs.

[2]Schofield, W. Fleming and W. H. O'Brien. Modern timber engineering. Southern Pine Assoc. 1948. p. 8.

Keel Blocks

Keel blocks—what else could be used, what is better than wood? These members, on which vessels rest while in dry-dock, are normally white oak, except in those locations where a suitable tropical wood locally available can be used. Santa Maria (*Calophyllum sp.*) has been found entirely satisfactory for this purpose by the Mechanical Division, Balboa, C. Z., where it has been used for docking various commercial vessels up to 20,000 tons in weight. Some experience has also been gained in the use of laminated oak keel blocks to replace solid white oak timbers of the required large dimensions.[3] Laminated keel blocks fabricated from sawn cants of low grade timbers showed more uniform physical properties and less checking than solid members. Douglas-fir keel blocks are occasionally used for small vessels and short time loading; however, when used as a core material in laminated assemblies, the performance was less satisfactory than solid or laminated oak.

[3]Tests on laminated keel blocks. Puget Sound Naval Shipyard Rept. No. T 11669. 1945.

Wood Decking

A major use of wood on large combatant ships is for the weather decks of battleships and cruisers and certain auxiliary vessels, where wood decking is laid in a fore and aft direction over the steel deck plate for comfort and appearance, to keep the temperature in living spaces more equable, to afford better footing in rough weather, and to facilitate topside access for damage control crews during intense fires when steel may reach extremely high temperatures. As a rule, decking measures 2½ inches by 5 inches, or 2 inches by 4 inches, with lengths not less than 16 and averaging 20 feet. Wider pieces are required for margins. Lumber must be of the highest quality, carefully selected, straight grained, free of knots, imperfections, or blemishes on the better (upper face) and along caulking edges. Fastening is by counter-sunk nuts screwed to deck studs which are welded to the steel deck. Wood plugs cover the fastenings. Joints are out-gaged and caulked with cotton, oakum, and marine glue, or with a special synthetic elastomer material.

Teak is the ace of all decking

woods and is purchased in accordance with detailed Navy Department Specification 39-T-1 evolved through many years of buying experience with inspection-at-source by naval officers. Purchase is in the forms of the highest quality planks, decking flitches, squares, and boards. The qualities of teak as a decking material have not been equalled by any known natural or synthetic material. The wood is prized for its durability, the ease with which it can be worked with tools, its dimensional stability after seasoning, non-splintering and non-corrosive properties, and its comparatively high strength-weight ratio. Teak has been the preferred decking on vessels of the fleet since 1901, when it was first authorized on the weather deck of the *USS South Dakota* (Fig. 1), and the reputation gained is recognized at present by shipwrights and admirals alike. In the years immediately preceding Pearl Harbor, far-sighted individuals in the Bureau of Ships established a teak reserve, and the fall of Singapore found U. S. Naval shipyards with a substantial quantity of teak in the form of squares, flitches, margin planks, and decking in stock. As a result of careful planning, utmost conservancy, use of substitutes, and development of various alternate materials, a small quantity of this reserve is still available for special purposes, and a limited procurement of this material was made in 1947 and in 1949. Its use is restricted due to scarcity of supply and an all-time high quoted price per thousand feet board measure. The excellent laminating adhesives developed in connection with the wartime shortages of oak timbers for wood vessels also serve to bond teak surface on a suitable grade of Douglas-fir. At the present time, due to high cost and limited availability, teak is seldom used in solid form, but applied as a laminated surface of from $\frac{3}{4}$-inch to $1\frac{1}{2}$-inch thickness, depending on whether intended for decking or margins and with Douglas-fir undersurface.

Vertical grain Douglas-fir ship decking, ranging from 2 inches to $4\frac{1}{2}$ inches in thickness and conforming to grading rules of the West Coast Lumbermen's Association, or southern pine of the same thicknesses in accordance with Navy Department specification 39-P-12 was installed on battleships, cruisers and certain auxiliaries as an alternate for teak. Margin pieces on these ships are of teak owing to superior performance of this wood in exposed locations. Teak deck slats $1\frac{1}{2}$ inches by 2 inches by 8 feet are preferred for submarine superstructure decking (Fig. 2), although white ash, Douglas-fir and laminated mahogany-maplewood battens of the same size performed satisfactorily in service. Except when battle damage occurs, a well-laid teak deck frequently performs satisfactorily for the life of a cruiser or battleship with only minor replacements. Douglas-fir and southern pine decks require replacement due to greater wear in service. When domestic softwood decks are installed, the ship design must be altered to accommodate greater thickness than would be required in a teak deck, due to more rapid wear of the former.

Fig. 1.—The first installation of teak as weather decking of a U. S. Naval Vessel was authorized in 1901 on the *USS South Dakota*.[4]

Numerous tropical American and African hardwoods have been tested at naval laboratories and under service conditions without complete satisfaction owing to excessive weight, warping, shrinkage and swelling, or imperfect seasoning. Additional investigations are underway to develop better methods of selecting and seasoning certain promising decking woods from tropical western hemisphere sources. The Navy is particularly interested in exploring the possibilities of developing tropical western hemisphere teak substitutes and work in this field is underway at the Yale Forest School and at the Material Laboratory, New York Naval Shipyard.

On the *USS Toledo* (CA133) approximately five thousand square feet of 2-inch thickness compreg-faced decking was experimentally installed in 1946. The wearing surface was made of 5 plies of $\frac{1}{8}$-inch thickness basswood veneers, resin impregnated and partially compressed to $\frac{3}{8}$-inch thickness and 0.80 specific gravity. The core was one-inch thickness selected No. 1 Common redwood lumber, no impregnation and no compression. The bolting panel consisted of 2 plies of $\frac{1}{8}$-inch thickness basswood veneers, resin impregnated and compressed to an overall thickness of $\frac{1}{8}$-inch. The underside was $\frac{1}{2}$-inch thickness selected No. 1 Common redwood lumber, no impregnation and no compression. A low temperature setting phenolic adhesive with an aqueous formaldehyde catalyst was used in laminating, under a pressure of 150 pounds

[4]This and all other photographs used with this article are official U. S. Navy photographs.

psi at 120° F. for 6 hours. Shipwrights reported a tendency for the compreg basswood face to spall at the ends of planks and around deck plugs. The $\frac{3}{8}$-inch thickness afforded insufficient protection against the impact of heavy blows, appeared to hold oil spots more than teak and was difficult to clean. Service wear performance of this decking at sea was unsatisfactory and it is presently being replaced.

In addition to displaying desirable physical properties, it is essential that alternate wood species for ship decking be available in plentiful supply for sustained commercial production of the required grade and sizes. A single heavy cruiser of modern design such as the 20,000 ton *USS Salem* required 54,000 board feet of 2-inch thickness decking and margins, and a battleship of the latest class such as the 45,000 ton *USS Iowa* (Fig. 3) requires 12,000 board feet of 2-inch by 4-inch decking, 86,500 board feet of $2\frac{1}{2}$-inch by 5-inch decking, and 11,500 feet of 2- and 3-inch thickness margin pieces, board measure. Wood decking requirements for the principal types of cruisers and battleships are given in Table 2.

Aircraft Carrier Decking

Wood competes with and outperforms steel as an aircraft carrier decking material. Aircraft carrier flight decks are generally of Douglas-fir, laid athwartship in 3-inch thickness, with planks 6 inches in width and averaging 16 feet in length. Approximately 300,000 board feet is required for a typical *Essex* class carrier such as the 27,000 ton CV20 (*USS Bennington*) (Fig. 4). On such vessels an important consideration is reduced topside weight and the fact that a major portion of the strength of the flight deck is provided by the wood decking. Douglas-fir decking proved acceptable in respect to weight but was deficient in wear resistance, splintering, and fraying under the impact of plane landings and gouging deeply under the impact of propellers and landing hooks.

In 1940, a comprehensive investigation was undertaken at the New York Naval Shipyard Material Laboratory to develop laboratory tests which would evaluate decking materials as to their suitability for shipboard use. Concurrently a letter was issued enlisting the cooperation of various manufacturers and laboratories in developing domestic decking materials to meet the needs of the fleet. A variety of products was submitted and the most promising subjected to laboratory and service tests. While complete compliance with all properties of an ideal decking have never been attained, some progress has been made by use of composite "compreg" or "impreg" faced decking manufactured from domestic wood species. Wood, treated or modified, acquires certain improved properties which increase advantages for certain shipboard structural applications.

Laboratory tests conducted in cooperation with the Forest Products Laboratory indicate that composite decking test specimens compare favorably with teak in many important strength properties, volumetric shrinkage, resistance to wear and splintering, thermal conductivity and inflammability, and is equal to Douglas-fir in weight. An early experimental installation of composite decking covering approximately 10,000 square feet in the landing area, approximately one-quarter of the distance from the after end of the flight deck, was made in 1944 on the *USS Bennington* which satisfactorily performed for 2 years of severe service, during which time more than 18,000 arrested landings were made. This decking was 3 inches in thickness, consisting of $\frac{1}{2}$-inch cottonwood compreg face, three $\frac{3}{4}$-inch redwood core laminates, and $\frac{1}{4}$-inch cottonwood compreg undersurface. The wearing surface was made of six $\frac{1}{8}$-inch thicknesses of cottonwood veneers, resin impregnated and compressed to a density of approximately 0.80. The undersurface was made of three $\frac{1}{8}$-inch thicknesses of veneers, similarly treated and partially compressed. The compreg and redwood laminates were bonded with phenolic adhesives. A later design for subsequent experimental installation consists of decking with a wearing surface of 6 plies of either impreg maple or compreg cottonwood, resin impregnated and glued. The core is made of two laminations totaling $1\frac{5}{8}$ inches untreated clear

Fig. 2.—The utmost in workmanship and serviceability is required of the teak deck slats installed on submarine superstructure.

heart vertical grain redwood. The bolting panel is made of two plies of 1/12-inch hard maple veneers, resin impregnated, glued and surfaced to $\frac{1}{8}$-inch. The undersurface is $\frac{3}{4}$-inch, untreated, clear-heart, vertical-grain redwood. The assembly is laminated with low temperature setting resin adhesive of a type employed in previous fabrication of composite decking, and described in Specification JAN-A-397. Deck plugs were made from trimmings of the same material. In laboratory tests, this decking proved equal or superior to teak in bolt holding, splintering resistance and hardness. The specific gravity is equal to Douglas-fir.

An objection raised by shipwrights in connection with the early installation of this new decking is that in shaping to conform to irregularities in the deck, portions of the compreg undersurface are frequently entirely removed reducing structural strength and also efficiency of deck bolt fastening due to bearing on soft redwood rather than the compreg. For this reason, the later design described in the preceding paragraph utilizes an undersurface of redwood and a bolt holding interior layer at a height permitting the shoulder of the securing bolt to rest on its upper surface. An auger for boring bolt holes was designed without vertical cutting fins and with a positive shoulder stop to avoid undercutting or weakening the modified wood layer.

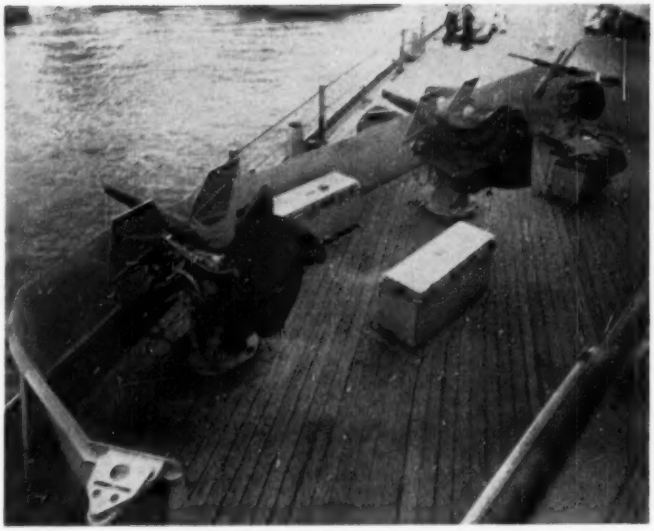

Fig. 3.—A close-up view depicting shipwrights' skilled handiwork in fitting teak decking, gun mounts and margin pieces on weather decks of *USS Iowa*. A tightly caulked, well fitted teak deck will remain tight in extremes of tropical and arctic weather and will perform satisfactorily for the life of the vessel.

Other disadvantages reported in service test of this material, which are as yet without correction, include increased cost in shaping from underneath rather than on topside after installation as is possible with normal wood decks; more rapid dulling of woodworking tools than in the case of teak; and a tendency of aircraft tires to slip on compreg more than on the remainder of the deck. Examination of tire marks indicates that aircraft tires slide from twenty to thirty percent farther on compreg than on fir decking. Since the ex-

TABLE 2.—WOOD DECKING REQUIREMENTS FOR MAJOR COMBATANT VESSELS

Type Vessel	Class	Species	Quantity required per vessel		
			Thickness		*Bd. ft.*
Battleships	BB 61, 62, 63, 64 (USS IOWA)	Teak	2"	decking	12,000
			2½"	decking	86,500
			3"	margins	11,500
Battleships	BB 55 & 56 (USS NORTH CAROLINA)	Teak	2½"	decking	35,500
			3"	margins	9,000
Battleships	BB 58 & 60 (USS INDIANA)	Same as for BB 55 & 56 Class			
Battleships	BB 43 & 44 (USS TENNESSEE)	Teak	2½"	decking	57,500
			3"	margins	8,000
Battleships	BB 45, 46, 48 (USS COLORADO)	Teak	Same as for BB 43 & 44 Class		
Battle Cruisers	CB 1 & 2 Class (USS ALASKA)	Teak	2"	decking	47,032
			2½"	margins	8,000
Heavy Cruiser	CA 139 Class (USS SALEM)	Teak	2½"	decking	46,000
			2½"	margins	8,000
Heavy Cruiser	CA 68 Class (USS BALTIMORE)	Teak	2½"	decking	46,000
Heavy Cruiser	CA 122 Class (USS OREGON CITY)	Teak	2½"	margins	5,000
Light Cruiser	CL 55 Class (USS CLEVELAND)	Teak	2½"	decking	37,000
			2½"	margins	3,000
Light Cruiser	CL 105 Class (USS DAYTON)	Teak	2½"	decking	27,000
Light Cruiser	CL 144 Class (USS WORCESTER)	Teak	2½"	margins	3,000
Aircraft Carriers	CV 6-13	Douglas fir	3"		267,500
Aircraft Carriers	CV 14-47	Douglas fir	3"		298,500
Aircraft Carriers	CVL 22-30	Douglas fir	3"		148,500
Aircraft Carriers	CVL 48 & 49	Douglas fir	3"		150,600
Aircraft Carriers	CVE 9-55	Douglas fir	3"		126,000
Aircraft Carriers	CVE 55-104	Douglas fir	3"		114,000
Aircraft Carriers	CVE 105-122	Douglas fir	3"		112,000

perimental installation is in the area covered by arresting gear, no basis exists for decision as to the desirability of covering the entire deck with this material. The increased skidding tendency might prove to be a great hazard in the midsection of the deck. Advantages of compreg faced decking are that it has better wear resistance, it does not sliver or splinter, and it scars less under the impact of plane landing hooks than Douglas-fir decking. Its higher initial cost is offset by longer service life and by fewer fastenings and less caulking required due to greater width of decking. The service performance of this decking under operating conditions is proceeding.

A variety of additional experimental laminated decking assemblies having 1-inch thickness hardwood faces, such as teak and undersurface of domestic wood species, are undergoing service testing as deck margins and as protection against tail hook accidents aft of securing tracks on the landing area of aircraft carriers. Some of these materials are undergoing service test on active and on reserve fleet vessels.

A panel of seven different 2-inch decking woods is being subjected to simulated service evaluation complete with constant exposure to weather, wear and periodic salt water scrubbing at the Norfolk Naval Shipyard.

The Forest Products Laboratory is developing resin treatments for improving decking performance of various domestic woods and in cooperation with the U. S. Plywood Corporation is evaluating honeycomb and sandwich assemblies. The related work of the Munitions Board ANC Committee on evaluation of these materials for aircraft is also of value to the Bureau of Ships. At the plant of Gamble Brothers, Louisville, Kentucky, laminated domestic decking materials with improved strength are being developed. "Fibron" is also being evaluated at private and shipyard laboratories for decking use. Fibron is a low density inexpensive structural plastic with organic and inorganic filler material. Portland cement, natural clays and

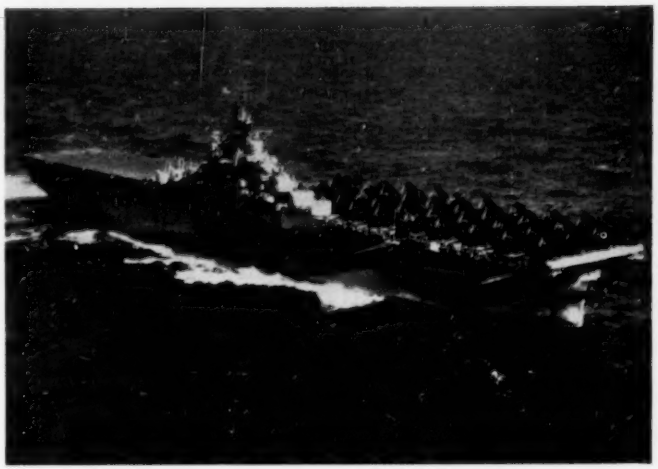

Fig. 4.—Approximately 300,000 board feet of 3 inch thickness decking is required for flight decks of an aircraft carrier such as the 27,000 ton (CV20) *USS Bennington*.

thermosetting resins are used as binders. These recent developments greatly increase the importance of wood as a ship decking structural material.

Floor Bearers of "Compreg" Maple

Hardwood "compreg" having specific gravity ranging from 1.10 to 1.37, either parallel-laminated or cross-banded construction and having physical properties described in Navy Department Specification 32-W-2, is used in sizes 1½ by 3 inches and varying lengths as supports under cold storage spaces and magazines on combatant ships. The material possesses low heat conductivity and great impact and compressive strength required for this application, and is not affected by heat applied in welding steel overlay.

Fire-Retardant Treated Lumber and Plywood

Fire-retardant treated damage control shoring is provided on all types of combatant vessels for the strengthening of structural members in case of damage. Sizes range from 6 by 6 inches by 14 feet to 4 by 4 inches by 8 feet timbers and 2 by 10 inches by 14 feet and 2 by 4 inches by 12 feet plank. The members are of a structural 1900f stress grade Douglas-fir or 1500f stress grade Sitka spruce and are pressure-treated for high fire-retardance in conformance with Navy Department Specification 51-C-40 and using fire-retardant chemicals conforming to the types 1, 2, 3, and 5 of Navy Department Specification 51-C-38. Battleships, large cruisers, and aircraft carriers each have 160 such treated timbers and planks stored in readily accessible places, while other combatant vessels have a proportionally smaller quantity. In many cases the members are identified by a coating of red fire-retardant paint. Fire retardant plywood made by treating and subsequently drying veneers prior to gluing assembly or by pressure treating marine grade plywoods is described in Military Specification Jan P-66. The principal shipboard uses of fire-retardant plywood include interior floors, bulkheads, control boxes, and engine covers on a number of small wooden boats and as spare parts boxes on some vessels. Fire-retardant treated lumber and plywood was also used at naval shipyards when specified for the repair of foreign vessels. These uses included grating, paneling, furniture, partitions, hatch covers, interior walkways and decking.

Stern Tube and Strut Bearings

Many tons of lignum vitae logs and blocks conforming to Navy Department Specification 39-L-2d are

stored in fresh water tanks at naval shipyards and repair activities, for use in underwater stern tube and strut bearings. The peculiar hardness, toughness and natural lubricating properties of this wood resist the wear and tear of the revolving propeller shaft and operate as a bearing that needs no oiling during its useful life. The silent operation of a properly installed lignum vitae bearing is an important feature of modern submarines. Inroads made during the past conflict on the choice grades of this wood has stimulated conservation measures in the several Western Hemisphere producing countries and search for synthetic substitutes in the United States.

Wood Materials in Wood Vessels, Small Naval Craft and Life Floats

Over thirty-five designs of wooden hull patrol, district and minecraft, landing craft, and auxiliary transport, salvage, and rescue vessels including hulls up to 183 feet in length were built in considerable numbers (Table 3), and added to the fleet during the past emergency. Over twenty-five designs of small wood boats (Figure 5) were also built in quantities approaching assembly line production (Table 4). The detail lists of lumber species and grades required for each design were reviewed and modified to conform with commercially available materials as a wartime service by a lumber reviewing committee made up of representatives from lumber associations and industry authorities on wood materials. Shortages of high-grade boat building woods were evident early in the war. As the supply of good, large-size oak timbers was found inadequate for frames, keels, stems, skegs, shaftlogs, knees, sternposts and deck beams for more than 50,000 wooden craft in our two-ocean Navy, a new process in laminating boat parts with low temperature-setting synthetic adhesives was developed through a research program of the Bureau of Ships in cooperation with the adhesive and lumber industry, the Forest Products Laboratory and the War Production Board. When urea formaldyhyde adhesives were found unsatisfactory in assemblies subjected to prolonged sea water exposures, intermediate or room-temperature-setting adhesives of phenol, melamine, or resorcinol base were formulated which retained a major portion of initial shear strength after prolonged weathering and salt water immersion. These adhesives are described in Joint Army-Navy Specification JAN-A-397. Intermediate- and low-temperature-setting adhesives (190° F. and below) are so named to differentiate them from high-temperature-setting adhesives (300° F.) used in bonding exterior grades of plywood. The manufacture of glued laminated stock requires closely controlled conditions and specialized knowledge and equipment. Properly seasoned and surfaced thin boards are machine spread with adhesive and assembled into the desired shape and size. A pressure of 150 pounds psi is applied through closely spaced clamps with equalizing heads. The assembled and clamped piece is cured at the required temperature under controlled humidity conditions.

TABLE 3.—WOOD REQUIREMENTS FOR NAVY WOOD VESSELS

Type craft	Est. Quantity (each craft) lumber	& Plywood	Approximate No. constructed
	Bd. ft.	*Sq. ft.*	
SC 110′ (submarine chaser)	31,350	3,320	310
PCS 136′ (submarine chaser)	49,340	7,000	65
PT 70′-80′ (motor torpedo boat)	19,300	9,300	650
AMc 88′-96′ (coastal minesweeper)	58,500		200
YMS 135′ (motor minesweeper)	49,340	7,000	460
BYMS 135′ (British motor minesweeper)	49,340	7,000	80
ATR 183′ (rescue ocean tug)	445,000	5,300	89
ARS 183′ (salvage vessel)	455,000	4,000	9
BARS 183′ (British salvage vessel)	392,000	1,800	6
APC 103′ (coastal transport, small)	40,000	3,000	111
YFD (timber floating drydock)			48
600 ton to 20,000 ton	571,000 to 5,190,000		

Laminated wood offers several advantages over one-piece solid members, which are difficult to procure in long lengths. Shrinkage and swelling are reduced to a minimum. Fabrication does not involve excessive delay in permitting material to season as in the case of one-piece timbers. Reduced labor cost in working laminated stock to final shape and reduced loss through defective material and increased serviceability make it only slightly more costly than solid timbers when installed. Laminated members can be fabricated in many sizes and shapes (Figures 6, 7). The significance of this contribution in improved wood utilization is immediately apparent, as only one white oak out of 200 produces

Fig. 5.—A 28 foot personnel boat with plywood hull.

Table 4.—Wood Requirements for Small Wood Boats

Type of Boat	Type of Wood Materials Used	Estimated Quantity Lumber & Plywood Used		Total No. units Constructed during World War II	$ Value Hulls[1]
		Bd. ft.	*Sq. ft.*		
Landing Craft					
LCVP, 36′	Plank & Plywood Hulls, Wood Frames	2,855	2,000	17,532	
LCPL, 36′	Plank & Plywood Hulls, Wood Frames	2,855	2,000	17,000	294,000,000
LCPR, 36′	Plank & Plywood Hulls, Wood Frames	2,855	2,000	2,300	
LCSS, 36′	Plank & Plywood Hulls, Wood Frames	2,855	2,000	560	4,480,000
LCV, 36′	Plank & Plywood Hulls, Wood Frames	2,855	2,000	2,350	18,800,000
Aircraft Rescue Boat, 63′	Plank Hulls, Wood Frames, Plywood bulkheads	16,450	7,845	500	30,000,000
Aircraft Rescue Boat, 45′	Plank Hulls, Wood Frames, Plywood bulkheads	11,500	500	150	3,800,000
Picket Boats, 45′	Plank Hulls, Wood Frames, Plywood bulkheads	11,500	500	480	10,000,000
Picket Boats, 36′	Plank Hulls, Wood Frames, Plywood bulkheads	7,495	3,611	200	3,000,000
Buoy Boats, 38′	Plank Hulls, Wood Frames, Plywood bulkheads	4,402	0	550	6,000,000
Plane Personnel Boats, 24′	Plank Hulls, Wood Frames, Plywood bulkheads	700	1,200	1,400	5,000,000
Plane Rearming Boats, 33′ & 35′	Plank Hulls, Wood Frames, Plywood bulkheads	1,200	1,900	1,800	10,000,000
Punts, wherries, dinghies	Planked Hull	315	0	1,200	400,000
Misc. Craft, Launches, Whaleboats	Planked Wood Frames	3,500	600	1,000	3,000,000

[1]Estimated total construction and material, costs, including machinery other than engines.

material suitable for bending into boat members. Any white oak can be utilized for laminated boat parts, and a much better selection of material is possible. Laminated keels, glued with resorcinol and phenol adhesives, without the use of bolts or nails, and numerous other laminated assemblies display excellent durability under extreme service conditions.

Plywood has found many uses both afloat and ashore for the side planking and transoms of certain small craft; panels over 40 feet in length have been fabricated by scarfing conventional commercial panels with a slope of one in 12 inches which has been found suitable for this rugged use. In order to obtain maximum performance from plywood hull vessels, a marine grade of exterior Douglas-fir plywood has been specified which differs from other Douglas-fir plywood grades in requiring a core and cross band of slightly higher quality (plugs and shims permitted) and a core gap limitation. Mahogany plywood is also used extensively and for some installations aboard ship, other grades of exterior type Douglas-fir plywood are used. Plywood is used both untreated and fire retardant treated, using especially impregnated, fire retardant chemicals. Plywood with resin treated paper overlay (plastic surfaced) is a relatively new boat building material.

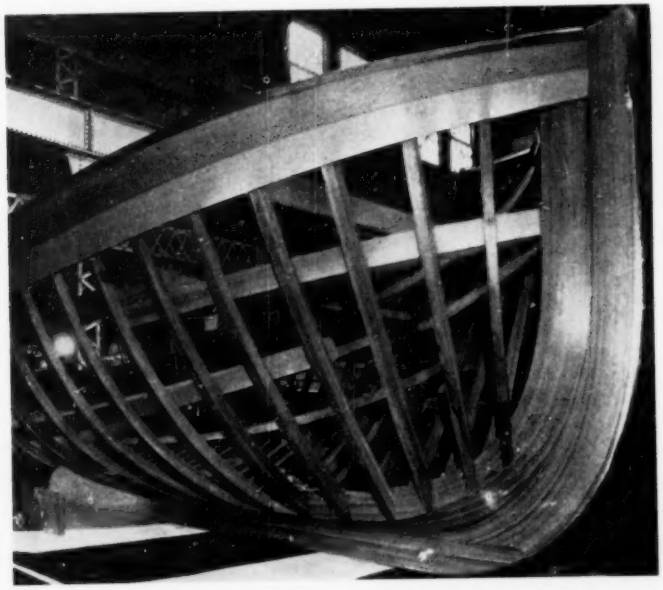

Fig. 6.—Completely laminated white oak 40 foot motor launch foundation.

As previously noted, white oak is most important in the construction of wooden craft of all types. A solid oak member of the highest quality 6½-inch by 7-inch by 42-foot material is used as the keel of the 50-foot motor launch. Keel members up to 80 feet in length for PT boats were laminated during World War II. Oak is used for keelsons, stems, shaft logs, frames, sheer strakes, clamps, coaming and fender cap and chines. The quality of bending oak procured under Navy Department Specification 39-0-6 is

such that it has been stated only one oak tree in 200 will produce the grade required. The Forest Products Laboratory is engaged in a study aimed at increasing the yield of bending oak from suitable trees.

Tests conducted by the Industrial Test Laboratory, Philadelphia Naval Shipyard[5], indicate that bending oak quality is considerably improved when end and side coatings are applied to the freshly cut planks at the sawmill. Such coatings serve to restrain the numerous seasoning checks which lower bending efficiency and recovery of usable boat frames. An excellent side coating developed at the shipyard consists of two coats of mica paint, made by combining two pounds of mica conforming to Navy Department Specification 52-M-3, with one gallon of spar-varnish conforming to Military Specification Mil-V-1174. Side coatings may be omitted when material is sawn during the winter months in northern latitudes and when the shipping distance is not great. End coatings are always required under Navy Department Specification 39-0-5.

Other ship and boat building woods used in considerable quantity include southern pine, Douglas-fir, cypress, southern white cedar, Port Orford cedar, Alaska cedar and mahogany for hull planking; spruce, white ash, white pine and ponderosa pine used for interior trim, and larch (hackmatack), redwood and western red cedar. Australian ironbark serves as ice sheathing for boats used in the Arctic and Antarctic waters.

Balsa wood is used for life floats, since this is a species which has peculiar characteristics desirable for flotation equipment. A problem exists in preserving the balsa wood since, in order to lengthen the service life, the preservatives used must be effective under extreme weathering, and must be compatible with adhesives used in the subsequent application of suitable covering material.

As shortages of these boat building woods develop, substitutes are sought. Frequently, it becomes necessary to resort to wood preservation to extend the service life of woods having low decay resistance. Considerable progress has been made in the development of preservative treatments suitable for use in boat building. Much, however, remains to be done both in the development of non-leachable treatments and in efficient impregnating processes which can be used while the ship is being constructed. Research to determine means for suppressing and completely arresting the deterioration of woods subjected to extremes of decay, weathering and marine borers is the key to wider acceptance of a great variety of wood species as a structural shipbuilding material. It is in this field that great strides will have to be made, to augment our scarce boat building woods of natural decay resistance. Investigations underway at the Puget Sound Naval Shipyard, together with certain developments by private interests show promise in this heretofore neglected field. These developments in extending the service life of wood materials are vital both to the preservation of existing ships and small boats and to new construction.

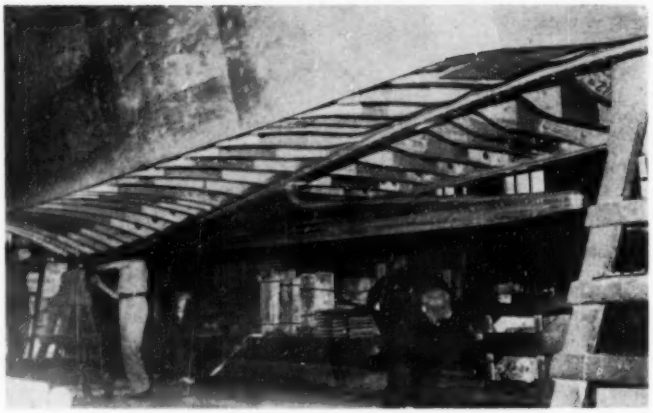

Fig. 7.—Laminated oak skeg for landing craft (LCVP).

[5]Chemical end and side coatings for white oak bending stock. Philadelphia Naval Shipyard (Industrial Test Laboratory) Report 2050-A. December 1946.

Germination of Eastern Redcedar Seeds

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ALTHOUGH A NUMBER of articles have been published on the germination of seeds of redcedar (*Juniperus virginiana*, L.), there is frequent disagreement concerning the effectiveness of different treatments of the seeds to improve germination.

Even though it is usually agreed that seeds should be freed of their fruit coats and stratified for a number of months before planting, the temperature factor is often disregarded (*4*, *7*). The importance of prolonged exposure of seeds to a temperature of 41°F. for successful germination was demonstrated by Pack (*5*). Bailey (*1*) recommended storing redcedar seeds at 41°F. for two or three months in sand or peat or a mixture of both. This temperature seems to be suitable for a number of other coniferous seeds; the optimum stratification temperature in most cases is between 33° and 50°F. (*2*). Jelley's results (*3*) are somewhat at variance with this, however. He found that good germination of eastern redcedar occurred after the seeds had been frozen for 21 days, but obtained only a low germination when the seeds had been exposed to a temperature of 41°F. for 66 days.

Scarification of redcedar seeds has also been tried by a number of workers as a means of improving germination. Although Pack (*5*) reported that removal of seed coats or treatment with various chemicals did not improve germination, Jelley (*3*) found that mechanical scarification of seeds improved germination. Stoeckeler and Baskin (*6*) also reported that mechanical scarification of redcedar seeds improved germination.

In order to test these various treatments further in an attempt to determine which treatments are most effective, the following experiments were carried out.

Methods

Experiment 1.—It seemed of primary interest to determine whether seeds of redcedar would germinate if they were picked from the trees and planted in a forest soil under natural conditions without any special treatment. This problem was investigated in the first experiment in which seeds were planted in a 30-year-old loblolly pine stand in January.

Cones were picked from a number of trees in November and divided into three groups. Cones of the first group were kept at room temperature for 2 months and planted intact in the pine stand. Seeds of the second group were freed of their fruit coats and kept stratified at room temperature for 2 months before planting. Seeds of the third group were also depulped but kept stratified at 41°F. for 2 months. Stratification consisted of placing the seeds or cones in moist sand and peat between layers of cheesecloth. Seed spots were cleared of litter and covered with wire screens, but otherwise seeds were left entirely to the natural conditions of the locality. Spots were observed for 16 months and counts made of numbers of seedlings present.

Experiment 2.—In the second experiment comparisons were made among groups of seeds that were kept air-dry in open beakers at 76°F. in the laboratory, with those stratified at 76°F., and with those stratified at 41°F. The period of storage in all cases was 93 days before seeds or cones were planted in a sandy loam soil in the greenhouse. In the first group, some seeds were further treated after removal of the fruit coats by either scarifying with sandpaper or being left unscarified. In the second group some seeds were left intact in the fruit coats, some depulped before stratification, and some depulped and cracked before stratification. Cracking was accomplished by compressing each seed in a watch-maker's vice until the seed coat was broken. Crushed seeds were discarded. In the third group some seeds were left intact in the fruit coats, some depulped before stratification, some depulped after stratification, and some depulped and cracked before stratification.

Hammer tests of seeds were made at the end of the stratification period in order to compare the viability of seeds kept at room temperature with those kept in the refrigerator room at 41°F. These tests showed no significant differences between samples from the two treatments. About 18 percent of the seeds in both lots appeared inviable according to this test.

Experiment 3.—A third experiment was carried out to determine more definitely the effect of removal of the fruit coat and the effect of scarifying the seeds. Cones or seeds were planted in flats filled with sand and peat immediately after picking. All flats were then stored for 106 days in the cold room at 41°F. At the end of this time they were placed in the greenhouse and observed for germination. The three treatments involved in this experiment were: (1) fruit coats not removed but entire cones planted directly in the sand-peat, (2) coats removed and seeds planted directly in the sand-peat, and (3) fruit coats removed and seeds scarified with sand paper before planting.

Results

Experiment 1.—Results of the first experiment showed that some degree of success may be expected if seeds are picked from the trees, freed of their fruit coats, stored either at room temperature or at 41°F. for 2 months, and planted out-of-doors in mid-winter. Results are presented in Table 1. Numbers indicate seedlings counted in each of three replications. Some seeds still inclosed in the cones germinated the first spring after planting but a larger number germinated the second spring. It should be understood that each cone sometimes contains more than one seed so that the very low germination of

[1]The author is indebted to Prof. Paul J. Kramer for advice in connection with the study reported in this article. The work was carried out at Duke University, Durham, North Carolina.

seeds planted intact in the cones is even lower on a comparative basis than shown in Table 1.

TABLE 1.—NUMBER OF SEEDLINGS COUNTED AFTER PLANTING IN JANUARY IN A LOBLOLLY PINE STAND

Date	Stored in cold room: Depulped a[1]	b	c	Stored at room temperature: Cones a	b	c	Depulped a	b	c
1948									
Mar. 23		3	3						
Apr. 6	5	10	5						6
Apr. 22	4	14	9		1	1	5	9	9
May 22	7	13	2	2	2	1	8	9	6
June 21	9	15	2	2	2		9	9	5
July 22	8	11	2	2	2		9	8	5
Aug. 22	8	11	2	2	2		9	8	5
Sept. 22	8	11	2	2	2		9	8	5
1949									
Jan. 22	8	11	2	2	2		9	8	5
Feb. 23	8	11	2	2	2		9	6	5
May 1	8	12	3	7	8	4	10	7	6

[1]Letters in column headings represent groups of 50 seeds or cones each.

Experiment 2.—The second experiment showed that of all the treatments to which the seeds were subjected, including dry storage at room temperature, stratification at room temperature, stratification at near-freezing temperature, removal and non-removal of fruit coats, and cracking of seeds, the only successful treatments were those in which the seeds were depulped and then stratified at near-freezing temperatures for 93 days. Results of successful treatments are presented in Table 2. The procedure of cracking the seeds made no difference in the final germination percentages. Cracked seeds, however, germinated significantly sooner than seeds not cracked. Practically no germination was obtained with seeds stratified or kept in dry storage at room temperature regardless of treatment to the hard seed coats. Cones which had been stratified at 41° F. and either depulped just previous to planting or left intact did not germinate to any appreciable extent. Apparently the fruit coat slows the after-ripening process or inhibits germination.

Experiment 3.—Results of the third experiment in which cones, depulped seeds, and depulped and scarified seeds were all kept in the cold-room at 41° F. for 106 days before bringing into the greenhouse are presented in Table 3. Seeds planted intact in the cones germinated to only a small extent, but about 65 percent of the depulped seeds germinated in both the scarified and unscarified lots by the end of the experiment. Seeds which had been both depulped and scarified germinated significantly sooner than depulped seeds which had not been scarified, although total final germination percentages were almost identical in these two treatments.

Summary

When seeds of eastern redcedar are freed of their fruit coats and planted out-of-doors in a forest soil in mid-winter, some germination may be expected. Even if seeds are not removed from their fruit coats, a few may germinate the first spring and a larger number the second spring.

Exposure of seeds to a temperature of 41° F. for 2 or 3 months appears to be essential for successful germination, although occasionally a few seeds may germinate when exposed to room temperature. Ordinarily, sufficient exposure to low temperatures will be obtained when the seeds are planted under natural conditions in the forest near Durham, North Carolina, so that a special cold treatment should not be necessary for seeds planted in the open forest in the autumn.

Scarification of seeds by abrasion or opening the seeds by cracking the seed coats resulted in earlier germination. It did not, however, increase final total germination in these experiments.

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TABLE 2.—NUMBER OF SEEDLINGS PRESENT IN SEED FLATS IN THE GREENHOUSE ON EACH OF DAYS SHOWN

Date	Seeds depulped, cold room moist storage, not cracked: a[1]	b	c	d	Total	cracked: a	b	c	d	Total
January 25	3	1	4	2	10	9	6	6	6	27
28	5	4	5	5	19	10	8	7	6	31
31	8	9	7	5	29	12	9	8	6	35
February 4	10	11	13	10	44	13	8	12	7	40
9	10	13	12	10	45	13	8	12	7	40
14	10	17	14	12	53	13	8	12	9	42
19	13	17	14	12	56	13	8	12	9	42
24	14	18	14	12	58	14	8	12	10	44
March 6	16	18	15	13	62	14	8	12	10	44

[1]Letters in column headings represent groups of 25 seeds or cones each.

TABLE 3.—NUMBER OF SEEDLINGS OBTAINED IN SEED FLATS PLACED IN GREENHOUSE AFTER KEEPING MOIST AT 41° F. FOR 106 DAYS

Date	Seeds depulped, scarified: a[1]	b	c	Total	not scarified: a	b	c	Total	Cones intact: a	b	c	Total
February 2		6	15	21		1	2	3		2	2	
5	28	36	47	111	16	16	26	58		3	4	7
7	37	43	52	132	46	35	39	120	1	9	9	19
12	49	46	54	149	29	20	29	78		3	7	10
17	52	47	55	154	55	44	52	151	1	10	12	23
22	52	47	55	154	58	44	54	156	1	10	13	24
March 6	52	47	55	154	58	45	54	157	1	10	13	24

[1]Letters in column headings represent replicate groups of 75 seeds or cones.

Determining Forest Landownership and Its Relation to Timber Management[1]

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WHO ARE THE OWNERS of forest land? How do these owners differ from or resemble each other in their timber management? Why are they following their present practices? These are important questions bearing directly on the policies of public and private agencies concerned with the improvement of timber management. Forest landownership and its relation to timber management is a relatively neglected field of research, but its significance is well illustrated by the U. S. Forest Service's recent findings of a wide variation in the kind of timber management practiced by different classes of owners.[2]

This discussion is concerned with the techniques and some of the problems to be considered in a study of forest landownership and its relation to timber management. For the most part, the discussion relates to the lower South, but much of it has general applicability. The study area in mind is a large block of land consisting, at least, of a state or a big portion of a state. As the term is conceived here, forest landownership is the control of the legal rights to forest land in fee simple, whether such rights are accompanied by similar controls of timber and subsurface or not. Public ownership will not be referred to specifically, but it will be understood that any classification of ownership will separate public forests from private holdings.

Who Owns the Forest Land?

To answer this question, only a small sample of the land area is needed. Sample blocks may be selected at random or according to some fixed pattern of spacing. They may be selected within each county or at random over the whole study area. In a recent study in Mississippi, 2-percent coverage of the total land area proved adequate for a reasonable standard of accuracy. Three sample blocks per county were selected at random, each block consisting of 4 square miles. This coverage, spread over a forest area of six million acres, provided a standard error of 2 percent for the estimates of forest area held by the three largest classes of owners. The weakest estimate, for a class of owners holding an estimated 73,000 acres, had a standard error of 12 percent.

An alternative to area sampling is the "line sampling" described by Hasel and Poli.[3] Essentially, this system involves drawing lines at regular intervals across a map showing property boundaries, and measuring the total length of line crossing properties in each class of ownership. The ratio of total length of line for any class to total length of line for all classes represents the percentage of total area held by the class of ownership. Theoretically, this method is as good as sampling by areas, at least for area determinations if not for number of owners, but it is handicapped more by a lack of adequate property records. Moreover, the fact that the method does not serve well the purposes of timber inspection and owner interview makes it generally much less useful than area sampling.

From county or other local government records, and from inquiry among local officials and other informed persons, the location of property boundaries in sample blocks, the name and address of each owner, total land owned in the property, and owner occupation can be obtained.

The most useful classification of properties, at least for initial descriptive purposes, is size of holding within owner occupation. Such a classification will divide properties into groups likely to be different in regard to management practices and will permit the grouping to be done simply. At a later stage in the study, various other criteria, such as distance of owner from forest, length of tenure, tax delinquency, or objective of ownership, may be considered, but the chances are that none of these will prove as generally useful for basic classification. Interest in the study described here is centered on individual properties as representatives of the class of ownership to which they belong, but for some purposes of analysis it may be convenient to consider each sample block as a unit and to classify it according to the predominant kind of ownership (dairy-farm block, lumber-company block, etc.).

Tax assessors and other local officials are commonly able to identify owners as professional workers or businessmen, wage earners, housewives, land speculators, lumber companies, farmers, etc. The county agent frequently can identify the farmers in his county as dairy farmers, cotton farmers, truck farmers, etc. By relying on these sources for a classification of owner occupations in the Mississippi study, an accuracy of about ninety percent was attained. If such a standard of accuracy can be attained in other regions and is considered acceptable, no adjustment of owner occupations by means of a field check is necessary.

Forest land area in each property is not likely to be found in county records, but by transferring property boundaries to aerial photographs, the proportion of forest on each property can be computed readily from a dot count. The forest land acreage held by each owner within the sample blocks can be expanded to the acreage it represents in the whole study area, and total land area computed for each class of ownership.

Any estimate of the total number of owners must be handled with caution, since a large holding has a greater chance of appearing in

[1]Presented at a meeting of the Division of Forest Economics, Society of American Foresters, Seattle, Wash., October 12, 1949.

[2]U. S. Forest Service. Forests and national prosperity. U. S. Dept. Agric. Misc. Pub. 668, 1948.

[3]Hasel, A. A. and Adon Poli. A new approach to forest ownership surveys. Jour. Land Econ. 25:1-10, 1949.

the sample than has a small holding. A method of minimizing this difficulty is to consider only those holdings some fixed point of which (such as the northeasternmost corner) falls within the sample blocks. Using this method in the central Mississippi study, the standard error was calculated to be four to five percent for each of the three major classes of owners, but it rose rapidly in smaller classes to a maximum of nearly sixty percent for a class estimated to contain only ten owners.

How big is this field job of making the 2-percent area sample? In Mississippi, a state of 82 counties, where records are not often detailed, the mapping of property boundaries in sample blocks, the recording of names of owners, owner occupations, acreage owned, and owner addresses required about five man-months of work. Transferring ownership boundaries to aerial photographs and determining the percentage of forest by class of ownership took another man-month of time.

Selecting the Sample for Interviews and Forest Inspections

Learning about the kind of timber management in practice and the significant factors which influence owners in their management decisions requires field examination. The only way management can be rated is to observe it on individual properties. Inspection of photographs will not serve the purpose. For investigating the influences on owners' management decisions, talking to the owners or their representatives directly is essential.

Mail questionnaires have been tried and at least one report has been based on them.[4] But there are grave weaknesses in a mail questionnaire which may invalidate the results. One is the failure of owners (usually a majority[5]) to reply. Another is the difficulty of getting correct answers by mail. This is not simply because people may be reluctant to answer certain kinds of questions honestly, but because misinterpretation of questions will invalidate many of the replies. A third weakness is that a written questionnaire must be brief to get a reply—too brief, in fact. It will be remarkable if the most important factors can be included, since no one can know in advance which will be the half dozen or so most significant items.

A number of statistical methods are open to an investigator for deciding upon the size of sample needed to insure a given standard of accuracy for forest inspections and owner interviews. However, the problem is complicated by the great variety of items, each of which would require a different size sample to arrive at a given standard of accuracy. Furthermore, the measure of accuracy cannot be undertaken until a large portion of the field data can be compiled and analyzed, and the computations involved may prove to be extremely laborious.

In practice, the investigator may well find that consideration of available time and funds, rather than sampling error, will determine the size of sample. He can calculate that a competent field man can hardly hope, on the average, to inspect management practices and to interview the owners of more than three properties a day. Thus, for example, to cover six hundred owners and properties will take about ten man-months of field work.

The main problem is not so much to choose the total sample as to allocate the sample properly to different classes of owners. Here again, several statistical courses are open. Other things being equal the simplest is preferred. The approach discussed here is to take a stratified subsample within the main sample blocks.

The size of the subsample drawn from each class of ownership can be made proportional to the forest area held by each class. Thus, if class A owns 10 percent of the total forest, 10 percent of the total forest area to be included in the subsample should be drawn from this class. Once the apportionment of the subsample to owner classes is made, individual owners and properties should be chosen at random, perhaps within strata such as geographical subdivisions of the study area. In some cases it may be necessary to go outside the main sample blocks to get a representation of owners, but if the subsample can be limited to the sample blocks, field work will be simplified, since maps showing property locations will be at hand from the previous phase of the study.

When selected owners have to be dropped perhaps because the forest land owned is less than an acceptable minimum size, or because owners cannot be traced, alternate owners, who are selected in advance for such eventualities, should be consulted. Finally, despite all misgivings about mail questionnaires, a shortened form of the field questionnaire may have to be mailed to absentee owners. To include even a partial response will be better than the omission of this group of owners from the sample.

Rating Timber Management

The only valid measure of current timber management is one that reflects current efforts alone. One approach that has been used is to rate properties on their condition—species composition, size of timber, volume per acre, and similar indexes. These items can be measured numerically, but their significance is dubious for several reasons: 1. Current inventory may be, and frequently is, a heritage from previous owners. It would be misleading to have a rating system which visits the sins of previous holders of the land on the present owners. 2. Similarly, current inventory reflects, at least partly, an owner's earlier attitude toward timber management, but his present views and actions may be drastically different.

Rating current management is

[4] Stoddard, Charles H., Jr. Future of private forest land ownership in the northern Lake States. Jour. Land and Pub. Util. Econ. 18: 267-83, 1942.

[5] In the Lake States study cited by Stoddard, 1,008 questionnaires were mailed, but only 492 owners replied. In a study in California (Poli, Adon, and D. T. Griffith. Forest land ownership in northern Mendocino County, California. Calif. Forest and Range Exp. Sta. Forest Survey Release 5, 1948), 328 replies were received to 900 letters written.

not a simple undertaking. To a large extent, it must be done qualitatively. Excellent management can be described, good management, fair management, etc.—in essence, a scheme like that used in the U. S. Forest Service reappraisal project. Numerical values cannot be given to these ratings, since it would be purely arbitrary to say that the difference in management between excellent and good is the same as the difference between good and fair. One can strive to set up equidistant ratings, but one cannot assume complete success in this attempt.

How are the rules for rating to be set up? In this, as in other phases of the study, no rigid procedure can be established. The management rating of each property (which applies to the whole forest area of the property) may be arrived at in one broad generalization, or it may be based on some combination of separate appraisals of cutting practice, fire protection, and other factors such as grazing which may be important. The weights to be assigned to each of the major elements in combining them into a management rating will vary considerably among different forest regions.

In the central Mississippi study, management rating was based on a combination of class of cutting practice and class of fire protection. For cutting practice, the most recent cutting on each property sampled was appraised, and if no cutting occurred either during the last 10 years or during the present owner's tenure, no attempt at classification was made. The general principle was to judge whether the most recent cutting would improve the stand, maintain it, or cause deterioration. The emphasis was not on the stand that was left, but on the anticipated stocking and species composition of the growing stock in the 10 years following cutting. For fire protection, the appraisal on each owner's property was based on efforts made by the individual owner or the state to control wild fires, and on the effectiveness of protection as measured by estimated average annual burn.

These principles of classification need not be accepted in whole or in part by other foresters. Each investigator can work out his own principles and rules and try to win the support of his colleagues. The only point of insistence is this: It is possible to devise a qualitative scheme of rating forest management on the basis of our present forestry knowledge. Foresters are rarely able to agree as to what constitutes the best practice for a particular forest type, but the art of forest management is not so empty as to leave us helpless to discriminate between widely varying practices. We should be able to appraise the management of a forest and decide whether it is excellent, good, fair, poor, or destructive.

The Questionnaire

The field interview can reinforce management ratings by including several items on cutting practice and fire protection. The interviewer can try to learn directly from the respondent if the forest area was last cut under the supervision of a forester, if the cutting was supervised by the owner or his representative, if a minimum cutting diameter was specified, if the owner makes an effort to stop uncontrolled fires on his land, if he has installed improvements to keep fires out, etc. The answers to such questions are reflected in the management ratings, but recording them separately in this way helps to reinforce conclusions about the kind of cutting and fire protection in practice.

Another group of items which should be included in the questionnaire cannot be described except in a general sense. These are miscellaneous influences on management or what are commonly taken to be influences. They include length of tenure, distance of owner's residence or place of business from the forest, method of acquisition, use of forest land, and objective of ownership. Two other meaningful items—provided they can be obtained without antagonizing the owner—are owner's income and education.

Finally, there is a group of questions which can be summed up by the word, "attitudes." What is the attitude of owners toward burning their own woodlands? Why do some owners burn their woods? What are the primary causes of forest fires in each locality? What concepts about timber management do owners hold? Do owners recognize that their management could be improved? What are the owners' explanations for poor timber management?

The method of getting at attitudes raises some strong questions about the whole approach to getting responses in an interview. Should the interviewer ask direct questions like, "Do you burn your woods?" To get certain kinds of highly impersonal, factual information, the direct approach is the best. For other types of information, it is likely to be a poor approach. Should the interviewer ask precisely phrased but indirect questions such as, "Has burning the woods hereabouts helped conditions, or made them worse, or hasn't it had much effect?" Should the interviewer simply chat with the respondent, draw him out in ways that suit the moment, and record impressions? Again, should he deal with each owner rather briefly, or should he spend as much time as the respondent will tolerate? Although neither the psychologists nor the sociologists are fully agreed on these problems, it may be helpful to have one of these specialists on hand as consultant or collaborator.

Regardless of the approach used by the interviewer, the big question remains, "How valid are the answers?" This is impossible to determine accurately. But it is the function of the analyst (who, incidentally, should do a good share of the field work) to decide what the answers mean. In some cases, inferences drawn from answers can be more valid than the answers themselves taken at face value.

So much judgment by the investigator takes some of the science away from the method used. Nevertheless, if the results are not always precise, they are usually valuable. Underlying attitudes are

a chief factor in explaining the forest management practices by landowners. If good management is to be encouraged, these attitudes must be understood. And to investigate some of these attitudes, there appears to be no adequate substitute for asking questions.

Analysis

Although questions may not always be asked directly, results should be recorded in precise fashion. If the range of answers can be given on the form, the answer applying to a given owner need merely be checked. Does the owner have a forester supervise cutting operations? The answer is either *yes* or *no;* a written-in statement with qualifications does not lend itself to coding and transference to punch cards, which is one efficient method of compilation. If the owner burns his own woodland, what are his reasons? As many as possible of the expected reasons should be written on the form; in effect, coded in advance: 1. improvement of hunting, 2. improvement of grazing, 3. to kill insects or snakes, 4. to reduce fire hazard, and so on. As soon as a new reason is encountered, it should be added to the list and given a code number. For each owner, a specific reason is checked, or several reasons may be checked in order of importance.

In addition to relying on field forms, the investigator may find it useful to make notes of his strongest impressions in the field. If taken throughout the course of the study and digested and summarized from time to time, these notes have great value in indicating the items needing closest analysis.

If the field forms have been drawn up properly, the job of coding and transferring data to cards will be almost automatic. However, one item, "forest land owned," needs to be modified before it can be transferred. The area appearing on an interviewed owner's card should be not the forest land actually owned, but the total forest land represented by the owner as an item in the sample. An expansion factor is applied to the area actually held by each owner sampled so that the total for the owners sampled in each class will equal the total forest land held by the whole class of ownership in the study area. On any card sort, the expanded areas permit tabulations which will apply directly to the whole study area.

Analysis will take the form principally of comparing various items in regard to the distribution of forest land area by management rating; *i.e.*, the percent of the total falling in "good," "fair," and "poor," or whatever classes are used. The first step is to tabulate the distribution of area under each management rating by size-of-holding within owner-occupation class. Then, looking all the while for significant differences in management-rating distribution, examine the distribution of area by management ratings in items such as the amount of forest land taxes, length of tenure, distance of owner from forest, objective of ownership, and various attitudes toward timber management. In all these comparisons, data should be segregated by class of owner, wherever such segregation will result in a substantially different distribution of forest area by management rating.

Cause and effect cannot often be demonstrated, but relationships can. For example, the tabulations may permit the conclusion that large holdings are associated with better management than are small holdings, that poorer management is encountered as the distance of owners from forests increases, and that as owners' concepts of timber management improve, management rating also improves.

Some items do not require comparisons with management ratings or any other items. They are of interest in themselves. In this category are included opinions about the primary causes of forest fires in an owner's locality, the reasons why landowners burn their own forests or their fields, and owners' explanations for poor timber management. These items may be compiled by numbers of owners, but a compilation by forest land area will usually prove more useful.

Admittedly, the details involved in a study of forest landownership and its relation to timber management have been skimmed over, but in their main outlines the approaches described should provide satisfactory answers. If carried out in a number of representative states of the important forest regions, ownership studies, as conceived here, could contribute much to the proper shaping of policies and programs by public and private agencies.

Forest Ownership Research in Historical Perspective[1]

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The present forest ownership pattern in the United States is a product of over three hundred years of development. The author, in commenting on the preceding paper, sketches this long history and shows how a proper historical perspective would not only facilitate ownership research, but also help to shape more realistic forest policies.

WHO OWNS THE FORESTS in the United States and how the owners manage their property have been frequent subjects of inquiry, but very little has been written on ownership research methods. The special committee of the Social Science Research Council that completed *A Survey of Research in Forest Land Ownership* in 1939 outlined the direction of needed investigation, but did not attempt to cover "detailed methodology" (*9* pp. 4 and 16). The U. S. Forest Service, which has for many years been compiling data on ownership and condition of forest land, has not issued any comprehensive instructions for ownership surveys. The latest and most complete Forest Service report on the management status of forest land outlines only enough of the "criteria and methods" employed on the study to enable the reader to interpret the results (*11*).

For this reason, two recent papers on ownership survey methods are of considerable interest: One by A. A. Hasel and Adon Poli, "*A New Approach to Forest Ownership Surveys*," (*2*) and the other by Lee James (see preceding article). The first paper stresses sampling methods, while the second emphasizes techniques for studying private forest management practices. Together they provide a useful introduction to ownership survey methods. But both papers are lacking in historical perspective. Apparently the authors became so engrossed in detailed methodology that they failed to look back to see where they came from or ahead to see where they are going. This has not only resulted in several technical errors but it has left the researcher poorly equipped to interpret his findings. My purpose, as far as space will permit, is to remedy this deficiency.

Certainly the present pattern of forest ownership, which is a product of over three hundred years of development, cannot be understood without some knowledge of that long history. Lee James does not attempt to supply any historical material, while Hasel and Poli only make a few random historical observations which are not entirely accurate. For example, they say with reference to early American land policy, that "little thought was given to the type of ownership pattern which the land grants and patented ownership holdings would produce" (*2*, p. 1). Nothing could be further from the truth. The question of how to divide the land resources of America among the land hungry people from Europe and from the eastern seaboard was probably debated by every crossroads politician as well as by the best political minds in the country. These debates resulted in the adoption of definite land policies and in the enactment of legislation to carry those policies into effect. Hasel and Poli have mistaken partial failure of policies for lack of policies.

From earliest colonial times the dominant land policy in America was to settle unoccupied land so as to build economic and military strength. In New England the usual objective was to establish compact settlements of small, family-size farms. Larger and more scattered estates or plantations developed in New York and further south where conditions were less austere (*3*, p. 36). Even where very large grants were made to an individual or company the ultimate objective was usually to get the land into the hands of smaller resident owners. The American Revolution and the democratic traditions which it fostered, strengthened the trend towards small ownership. This movement culminated eventually in the Homestead Act of 1862 which provided 160 acres of free land for each settler (*16*).

Little distinction was made between the disposition of forested and nonforested land until after the Civil War.[2] This was because substantially all the eastern portion of the continent was forested and because it was expected that most of the land would be cleared for farming (*3*, p. 142). The development of a separate policy for the sale of public forest land resulted from the following factors: Post-war expansion of settlement into the Great Plains accentuated the differences between forested and nonforested land and created vast new markets for wood. People were used to taking what public timber they needed and continued to do so on an increasing scale. The lack of adequate provision for sale of public timber and timberland encouraged theft of timber and acquisition of timberland by fraudulent means. Application of steam power to sawmilling and transportation enlarged the scope and destructiveness of forest exploitation. Forest fires also destroyed vast areas of timber.

By the 1860's and 70's these processes had advanced far enough to convince a few people that the future supply of timber was endangered, that some of the devastated forest land was not suitable for farming, and that destruction of the forests resulted in serious floods and even climatic changes.

[1]Presented at a meeting of the Division of Forest Economics, Society of American Foresters, Seattle, Wash., October 12, 1949.

[2]Notable exceptions to this were the "Broad Arrow" policy instituted by the British to protect mast trees for the Royal Navy, and the naval reserves established after the Revolution.

George P. Marsh, Franklin B. Hough, and others tried to bring these matters to public attention. From the beginning they seemed to realize that ownership was a key to the problem. In his pioneering work, *Man and Nature*, published in 1864, Marsh expressed doubt that federal ownership and management could save the forests since the government had already proved incapable of protecting the naval timber reserves (*7*, p. 233). Dr. Hough, in his famous paper presented to the American Association for the Advancement of Science in 1873, took for granted that American forests would be privately owned and discussed such problems as permanence of land tenure and the need for educating owners to better forest practices (*4*, p. 4).

The Commissioner of the General Land Office considered alternative forms of forest ownership in his annual report for 1875. In theory he favored government ownership with cutting restricted to trees that could be removed without damaging the forest. But, since dishonest administration seemed inevitable at that time, he hoped that private owners would find it to their advantage to protect their timber and not use it improvidently. He also believed in limiting the quantity of land that could be bought and sold to any one person, but feared that such a provision could not be made effective (*15*, p. 12).

In the same year Congress also debated public versus private ownership and large versus small ownership, in considering the disposition of southern timberland. One senator proposed that the land should be retained by the government and the timber sold under proper regulations in lots of not over 320 acres. But the majority of Congress favored private ownership. As to size of private holdings, the danger of monopoly of timber supplies was clearly pointed out in both houses of Congress, but the law which was finally enacted authorized the sale of southern timberland in unlimited amounts (*5*, pp. 49-53).

However, the Timber and Stone Act which was passed in 1878 provided for land sales of not more than 160 acres to each purchaser in the far western states (*17*). The avowed purpose of this law was to transfer small tracts of forest land to settlers and others who needed the timber and could protect it. This was in line with the prevailing national policy of small ownership of land.

As we know, this policy proved difficult to enforce under pioneer conditions. The Timber and Stone Act, the Homestead Act, and other means were widely used to accumulate large timber holdings. Much of the land granted to the states and railroads, which was intended to go into small ownership, never got out of the hands of large owners and speculators (*3*, pp. 248-263).

As time went on it became evident that neither large nor small owners were effective in protecting the forests. Destructive logging and fires continued to exact a heavy toll. Failure of private ownership to live up to expectations led in 1891 to the adoption of a new national policy of reserving and protecting some of the remaining blocks of public timberland. The authority to establish public forest reserves (*18*) was rushed through Congress without much debate, but it represented the culmination of years of discussion (*5*, pp. 109-118).

From all these facts it should be clear that, however confused the ownership pattern may seem now, it did not develop blindly. Throughout most of American history the recognized policy was to get public land into the hands of private owners, preferably small resident owners, on the theory that whatever use was made of the land by the owner would also be in the best interest of the general public. Large ownership came as a result of economic forces which American leaders were well-aware of, but which they could not or did not adopt effective means to control. Public forest reserves are a relatively recent development, consciously designed to compensate for deficiencies in private forest management.

Adjustment between these three types of ownership has been a continuous process which is still going on. Some of the early forest reserve boundaries were established hurriedly and had to be changed. The Act of 1897, which first provided for protection and administration of the forest reserves, also authorized the exchange of unperfected private land claims or patents inside the reserves for other public land outside (*19*). Although this provision was subject to abuse, it is noteworthy because it represents an early attempt to adjust the ownership pattern.

Establishment of the forest reserves had an indirect effect on private ownership. It precipitated a rush by lumbermen and speculators for the remaining unreserved public timberland. Rising lumber prices and fear of monopoly of timber supplies by these large owners led in 1906 to the first national survey of the status and effect of private ownership of forest land. This investigation, which was made by the Bureau of Corporations, disclosed that four-fifths of the nation's forests had passed into private ownership and that nearly half of the private timber was held by 195 large owners (*12*, p. xx). The Bureau gave little attention to private forest practices, for the following reasons:

> "It is true that man cannot add a single ton to the earth's natural deposits of minerals, whereas the supply of standing timber can be increased by planting; but practically no effort of that kind has so far been made." (*12*, p. 4)
>
> "In the course of time, labor and capital will be used to grow trees; but even a period of thirty years would suffice to grow only timber of low quality, and to grow trees of some species as good as those now being used is utterly out of the question commercially, because of the long period required." (*12*, p. 32)

In 1920 in response to a resolution introduced by Senator Cap-

per, the Forest Service hurriedly brought the Bureau of Corporations' figures up to date. This second report went little further in appraising private forest management practices (*13*). Even at that time there were so few owners following good forest practices that the results of such an appraisal would have been largely negative. Most lumbermen were still convinced that forestry was "impractical, impossible, and unprofitable" (*1*, p. 1406).

Because of the lack of progress in private forestry a vigorous campaign developed during the early 1920's to obtain public regulation of private forest practices. This movement was unsuccessful, but apparently it stimulated voluntary adoption of better practices by a number of private owners. It also resulted in Forest Service studies of proposed cutting regulations. When the campaign for public regulation collapsed, these studies were converted into a series of bulletins on timber growing and logging practices to guide forest owners in each region.

In 1930, with these bulletins as a background, the Society of American Foresters, assisted by the Forest Service and other agencies, made the first national survey of private forest practices. This inquiry was continued by the Forest Service and summarized in the "Copeland Report" of 1933 (*6*, p. 896).

These surveys showed that a conscious effort to grow timber was being made on not more than seven percent of the private forest land in the United States, excluding farm woodlots. Less than one percent of the private, nonfarm forest land was being managed so as to produce a sustained yield of timber products. A tendency was also noted for some owners to abandon good forest practices, apparently because of the business depression.

The "Copeland Report" was followed by several other analyses of forest ownership and management (*8*, *10*). In 1940 and again in 1946 the Forest Service completed resurveys of the ownership and management status of American forests (*11*, *14*). Each new survey was more comprehensive than the previous one. The 1946 study is especially noteworthy for its scope and content. Unfortunately the results of these surveys cannot be used to study trends in forest practices because of the changes in survey coverage and methods.

Although this brief discussion has not covered any regional, state, or local studies of forest ownership and forest practices, it shows how wrong Lee James is when he says that this is a "relatively neglected field of research." A vast amount of cooperative effort, both in and out of the Forest Service, has gone into this work during the past twenty years: first in developing forest practice standards and then in applying those standards to innumerable forest holdings around the country.

These past studies have acknowledged deficiencies, but these very deficiencies should prove of value in shaping new projects. For example, the lack of uniformity in the Forest Service surveys of 1933, 1940, and 1946 indicates the need for more permanent standards. On this point James says, "no rigid rules can be established" for rating forest management, and "each investigator can sweat out his own principles and rules" of classification. But we should have learned enough from twenty years of experience in this field to agree on some more permanent rating system so that we can study the fluctuation in management practices.

James ignores recognized trends in management when he says, "the only valid measure of current timber management is one that reflects current effort alone." But as foresters we are interested in permanent forest management, not in how the owner happens to be cutting at a particular time. Experience has shown that when business conditions are good or when there is a threat of public regulation, some owners will adopt good forest practices, to abandon them later under economic stress. That happened in the early 1930's and it may happen again. So we need to measure permanent forest management and not current effort alone.

James also seems to overemphasize the factor of size of ownership when he states that "the most useful classification of properties, at least for initial descriptive purposes, is size-of-holding within owner occupation." No other "criteria will prove as generally useful for basic classification." This stress on size of ownership may be an unconscious heritage from early surveys that were designed to study the effect of concentration of ownership. Monopoly and combinations in restraint of trade may still be a threat to consumers of lumber, but most foresters are more interested in the ability and intention of owners to follow good forest practices. Size of ownership is only an indirect measure of that.

James is not alone in his preoccupation with size of forest ownership. Many foresters, who at one time were obsessed with a fear of concentration of ownership, have now shifted to the viewpoint that small ownership is the insuperable obstacle to better forest management. They say that small forest owners are inefficient, unstable, and difficult to control, and dream of a forest Utopia of well-managed and uniformly large holdings. Their lack of appreciation of the role of small ownership in American public land policies has blinded them to some of the real benefits that may be derived from wide dispersal of forest land among townspeople as well as farmers. Because they fail to recognize that small forest ownership is a permanent element in the American forestry pattern, they have neglected to develop an adequate forestry program for small owners. Thus a better understanding of the history of forest ownership not only facilitates ownership research, but also helps to shape practical forest policies.

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Rural Fire Protection in California[1]

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THE CONTROL OF WILD FIRES in California embraces multiple problems. In order to give a degree of adequate protection to our most valuable watershed, timber, and grazing lands, we find that we must be skilled in all phases of fire control. This can range from the specialized field of oil fires, through structures, to the Herculean task of controlling timber fires in rugged terrain under adverse conditions.

California has two basic mountain ranges, running north and south with a large valley region separating them. The southern part of the state has broken topography with a desert region to the east and coastal plains on the west, with mountain ranges in the center rising to elevations of eight and ten thousand feet in the matter of a few miles. The vegetative cover varies from vast timbered areas of the north to the primary brush-covered watersheds of southern California. During the prolonged summer season, high fire-hazard conditions exist. These vary considerably throughout the state, but the areas of population encroachment are, as a rule, in the flash-fuel types adjacent to primary watersheds and valuable timberlands.

The responsibility of the California Division of Forestry is to protect watershed, timber, and grazing lands. Private lands of the state are designated by three basic zones. Zone 1 comprises lands of national-interest values called the "Clarke-McNary Zone." They are the heavily timbered private lands and the most important primary watersheds. Zone 2 consists of lands of state interest only with no Clarke-McNary participation, but the zone is of vital interest to the state as it includes secondary woodland, watershed types, and grazing lands. Zone 3 comprises lands of primary local responsibility. Our organization is geared to the protection of Zones 1 and 2. Structure fires as such are a local responsibility, but because our statewide-interest lands are occupied by thousands of homes we find that if a fire starts in any one, it can cause a wild fire. Therefore, on the state-protected lands we must take action on all fires. To November 1, 1949 we had 3,099 fires in these two zones; 595 were structures, while 2,504 were forest, watershed, and range fires burning a total of 135,028 acres.

The fire season will range from 6 to 8 months during the summer season. We receive cooperation to extend protection in many of our localities the year around. In many counties where we operate there are lands of local interest that need fire protection. The Division of Forestry at the request of the counties has expanded its protection network to these areas. The magnitude of this task can best be summarized when one understands that up to November 1 of this year we have had 4,676 fires in zone 3. All the additional costs for this supplemental protection are defrayed by the counties or districts through agreements with the state forester. We recognize that from an economic standpoint one organization can do the work more efficiently and more economically than by establishing separate organizations for structure protection or county responsibilities.

While our organization extends over nearly one half of the area of California, the rest of the state comes under the protection of the national forests, incorporated cities, county protection organizations, and fire districts. The protective organizations of the national forests, counties, districts, and state work together as a team, giving mutual aid to the fullest

[1] Paper presented at a meeting of the Western Forestry and Conservation Association, Portland, Ore., December 10, 1949.

extent as it is recognized that wild fires know no arbitrary boundaries. Many fires start in one organization's area and rapidly spread to another's. Thus joint action is common rather than the exception.

The demand for rural fire protection as a public service is growing in California. The need is accentuated by the increased population as more people move into the surrounding countryside, leaving the metropolitan areas. As this population increased, we found ourselves faced with the problem of increased risk to our statewide values and a demand by the local people for protection to their physical structures.

The matter of structural protection is generally met in two broad ways. The first is the more simplified. The Board of Supervisors recognizes that it has a responsibility to the local areas to furnish some fire protection. In this case a countywide fire department outside incorporated cities is established. The expenditures are born out of the county general fund. In the case of counties where the State Division of Forestry is operating, the Board of Supervisors enters into a cooperative agreement with the state forester for supplemental protection. This allows one organization to carry on year-around, uniform fire protection in practically all areas in the county outside the incorporated cities and the national forests. Usually a fire plan is submitted to the Board of Supervisors. This plan helps to justify the location of the stations and the degree of protection to be added to the state in handling the overall protection. The main problem in this type of organization arises in the establishing of new county-responsibility fire stations, as all the communities want stations in their areas. As long as the board holds to its plan, there is no trouble.

The second way of meeting the rural problem is where the Board of Supervisors do not recognize that they have a primary responsibility in furnishing fire protection to the rural areas, but believe it is a local responsibility. In such cases fire districts are formed to defray the costs of rural protection. This varies from a county which has fire districts scattered throughout the unincorporated areas with no central control, to highly organized rural fire protection organizations headed by a county firewarden in charge of all fire districts, as is exemplified by the high degree of efficiency which exists in Los Angeles County. The weakness of this method lies in the problem areas between districts that are without adequate protection.

There is no question that rural fire protection raises many problems when there are intermingling responsibilities. An example would be when an area of valuable timberland or watershed is taken over and developed as a large community without adequate protection. When this occurs, either the county unit will have to assume additional responsibility, or it will be necessary for the local people to supplement the state or county protection even to the point of establishing a fire district. When a volunteer fire department or a fire district is established for improvement protection, again a problem comes to the fore. If it is under local control will adequate protection be given to the statewide values? In many areas in California this problem has been met by the establishment of the county organizations, with the counties running it themselves or contracting with the state for the supplemental protection. A rural fire protection organization can be developed to cope with the diversity of fires that may occur, whether they be timber or a home, under ordinary conditions. The trend in California has been that ordinary small rural communities of a few thousand population can be given adequate protection by rural organizations, with special developments in the nature of adequate water supply to the town; but when it grows to include heavy industry and needs specialized city fire department conditions for full efficiency, it gets beyond the rural setup and should become a city-type fire department.

Rural fire protection has advanced in California to such an extent that in many areas it is effecting a substantial reduction in insurance rates. Although we can never expect to reach the efficiency in structural protection of a city fire department with its adequate water supplies, alarm systems, and close proximity of fire stations, we can through the use of tanker equipment, special developments, and trained crews establish a protective network in the rural areas that has a fair degree of efficiency based on the economic conditions that may exist.

Productive Capacity of California Timberlands[1]

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"CAN CALIFORNIA TIMBERLANDS bridge the gap?" The gap in question is, of course, the potential difference between the future demand for wood products in California and the supplies of such products which the Pacific Northwest may make available to us. Despite its apparent simplicity, the question turns out to be a rather slippery one when we try to pin it down. The three factors of California consumption, California production, and Pacific Northwest supply are all interrelated in such a way that it is almost impossible to define the gap. The suggestion has been made that, whatever California needs in the way of wood supplies in the future, the Pacific Northwest will provide. If we accept this estimate of the situation, we could very well conclude that there will be no future gap for California timberlands to bridge. Unfortunately, I do not believe the answer is quite that simple.

I am going to assume that we are interested in whether or not future timber supplies in California will be large enough to maintain the forest industries of the state at a level of activity more or less commensurate with what has been experienced during recent years.

From the economic standpoint, the future balance between timber supply and demand *may* be achieved in a number of different ways. For example, if future wood supplies in California were to fall materially below present levels, balance in the forest products market would come about either through substantially increased wood prices with consequent curtailment of consumption, or through greatly increased imports from the Pacific Northwest. In either event, it would mean permanent liquidation of important segments of existing primary forest industries in California, and a general contraction of all economic activity dependent on those industries. This method of bridging the gap is not what any of us want if, by reasonable foresight and intelligence, we can avoid it. Rather, we want to know whether our future timber supplies will be large enough so that we can expect to support in the future a forest industry with economic values comparable in magnitude to those which we have realized during recent years.

Accordingly, I would like to put the question this way: "Can California timber supply continue to support a forest industry of about the same size as the one we have at present?"

I am thus assuming that the market for future California wood products *can* be at least as large as it is today. A detailed justification of such an assumption lies outside my topic. But, in passing, I would like to call your attention to an article in the November *Atlantic Monthly* entitled "How big in 1980?" The author is Sumner Slichter, one of this country's foremost economists. After making a very interesting analysis of the outlook for the future national income in the United States, Mr. Slichter says this: "The economy would consume more raw materials [in the next 30 year] than have been consumed in the last century and a half." Even if we discount these figures substantially, there seems to be reasonable justification for judging future timber supply on the basis of whether it is adequate to maintain recent levels of output.

The Old-Growth Supply

As of 1945, there were in California an estimated 170 billion board feet of timber in commercial old-growth stands. This excludes timber on areas used intensively for recreation or otherwise withdrawn from cutting. Of the total, about 100 billion was on private land and 70 billion on national forests and other public holdings.[2]

How much of this 1945 old-growth supply will be available as industrial raw material 40 years from now? Lumber production in the state in the 4 years 1945-1948 has averaged just over 3 billion board feet per year, mill tally. Let us suppose that this also represents a reasonable estimate of average lumber output during coming decades. To determine the total drain on standing timber we must correct for overrun and add to lumber production allowances for timber cut for products other than lumber, for logging waste, and for annual losses due to fire, insects, and other enemies. These adjustments total an additional 800 million board feet. In other words, when lumber production averages 3 billion board feet per year mill tally, total drain on standing timber in California is likely to be about 3.8 billion feet, log scale.

Of this, probably no more than 1.3 billion feet (35 percent) could come from publicly owned timber without exceeding the allowable cuts established for public forest properties. This leaves an annual drain of 2.5 billion board feet to be met by timber in private ownership. At such an average rate of use, all of the 100 billion board feet in old-growth stands on private lands would be required for cutting before 1985.

Actually, of course, things will not work themselves out in such neat and clearcut fashion. Much timber on tree farms and elsewhere in private ownership will be under permanent management. As a result, substantial volumes of private old-growth may be retained as high quality growing stock well beyond 1985. As old-growth areas are worked over, more young-

[1] Presented at the annual meeting, Northern California Section, Society of American Foresters, December 3, 1949.

[2] Estimated on the basis of data appearing in A. E. Wieslander and H. A. Jensen, Forest Areas, Timber Volumes and Vegetation Types in California. Forest Survey Release No. 4. Calif. Forest & Range Experiment Station. March 1, 1946.

growth tracts will become merchantable and the proportion of the total cut coming from such areas will begin to rise long before the old-growth is gone. Existing estimates of old-growth volumes may be unduly conservative, logging waste may be reduced more than I have estimated, and new industrial developments may permit the recovery of greater usable volumes of wood from given quantities of raw material. But even the maximum foreseeable effects of such influences would not change the general picture very much. For our purposes, the principal point is that roughly 35 years from now, most of the timber cut in California will probably be coming from cutover land, if, in the meantime, lumber production remains at or near a 3 billion foot annual average.

Under such circumstances, whether, by 1985, our forest industry is to be a 3 billion foot industry, or only a 2 billion foot industry, will be very largely determined by the amount of timber growth then taking place in the state.

This conclusion is of practical present importance because it means that the size of our forest industry toward the end of the century will depend very largely on what can be done now and in the decades immediately ahead to grow the wood we will then be using.

Potential Growing Stock and Growth

California has over 16 million acres of commercial timberland which, if fully stocked with trees, *might* grow in excess of 6 billion board feet per year. The key to the question of California's ability to sustain its forest industry toward the end of this century lies in the extent to which we exploit this available growth capacity of the land. As a start in finding out where we stand in this respect, let us look at the current growth situation. Duncan Dunning, of the California Forest and Range Experiment Station, has made careful studies of current and potential timber growth in the state.

As of 1944, Dunning estimated current annual sawtimber growth on 16.4 million acres of commercial forest at 1.2 billion board feet. At the time of the estimate, 57 percent of the total area was still in old-growth stands which, because of high mortality rates, contribute little or nothing to net growth. As additional virgin areas are logged and converted to a more productive condition, total growth will presumably increase.

The expansion in growth that we can achieve during the next 30 or 40 years will depend primarily on what happens in three fields: first, the rate of forest utilization during this period; second, the extent to which the methods of cutting used in the woods are successful in building up growing stock; and third, the extent to which we manage our cutover lands so as to make the most of what is on them. Thus, one could make forecasts of future growth in California which might range all the way from 1 billion to 6 billion board feet per year, depending on what assumptions he makes as to the rate of cutting, the kind of cutting practice, the nature of utilization methods, and the intensity of timber management efforts. Under such circumstances any forecast of growth is of doubtful usefulness as a prediction of the future. However, an analysis of growth potentials can be of real value, if we interpret it, not as a forecast, but rather as a guide to what we would have to do to perpetuate the present scale of wood industry in the state.

On the basis of a carefully worked out set of assumptions, Dunning has estimated "potential future growth" by the year 2000 at 2.25 billion board feet per year. But to understand what is meant by this potential growth we must look at the conditions which he assumed in arriving at the estimate. Among the more important were the following:

1. Average annual *drain* during the next 50 years of 2.5 billion board feet per year.

2. *Intensive forestry*, sufficient to maintain growing stock and yield at 80 percent of the capacity of the site, on 2.8 million acres of the more productive land.

3. *Extensive forestry*, sufficient to maintain growing stock and yield at about 35 percent of the capacity of the site, an another 6.25 million acres.

Two aspects of this estimate should be stressed. First, it is based on an assumed level of drain well below what we have experienced during recent years. Therefore, if these current rates of drain are continued or exceeded, and if there is no corresponding increase in the area under effective management, we would fall short of realizing the 2.25 billion foot potential growth estimate.

The second major qualification involves the degree of stocking assumed. On the basis of aerial photo coverage, Wieslander and Jensen estimated in 1945 that, outside of old-growth stands, there were only 1 million acres of commercial timberland where over 50 percent of the ground was covered with timber. Conversion from this sort of measure to more conventional terms of timber stocking is difficult. Moreover, no weight is given in such overall statistics to recent improvements in cutting practice. But with due allowance for this, and keeping in mind other available information on growth rates on cutover lands, it sounds to me as though we still have a considerable way to go before we have the 2.8 million acres stocked to 80 percent of capacity, which is one of the major prerequisites for producing 2.25 billion feet of future growth.

If California timberlands are to "bridge the gap" on a basis which will maintain the industrial and dependent economy on anything close to its present footing, the facts that I have just cited suggest that we will have to get more growing stock on cutover land. This conclusion is based on the assumption that drain during the next few decades does not average in excess of 3 billion board feet per year. If, as some people have suggested, use of our forests should expand for a while to as much as a 5 billion foot annual rate, old-growth supplies will dwindle more rapidly than I have assumed, and the need for additional growing

stock to meet future demands will be correspondingly acute, and will arise at a proportionately earlier date.

The Investment Problem

The job of building up growing stock is usually considered in terms of prescribing methods of cutting and other treatments necessary to promote growth. But there is a second aspect which is of at least equal importance. From this second point of view, the job of building up growing stock involves a problem in capital investment. Growing stock is simply the physical plant needed to produce marketable wood supplies in the future. It is no different in this respect from the pulp mill which is built over a period of years in order to produce marketable pulp at some later date. The considerations that determine whether or not growing stock will be built up are identical in nature with those that determine whether or not the investment in the pulp mill will be made. The future adequacy of our wood supply, therefore, will depend very largely on how accurately we now appraise the outlook for current timber growing investments. The losses which would result from taking too pessimistic a view of this investment outlook will be just as real and just as great as those we would suffer as a result of over-optimism. In either event such losses would affect landowners, industry, labor, and the public at large. So it is important to private and public owners alike that the opportunities for timber investment be carefully and realistically appraised, and that public and private timber growing programs correspond with the results of the appraisal.

The most important factors involved in such an appraisal are the future outlook for stumpage prices, and the size of the initial capital outlays required; that is, the cost of such investment.

Many of the factors which bear on the stumpage price outlook have been discussed earlier in this program. My own conclusion is that timber values will continue to follow the long established upward trend, for a considerable time to come.

The technical forester's principal concern, however, is probably with the cost aspect of the investment problem. In the past there has been some tendency for us to think of the investment job in terms of how we could maintain a productive forest at minimum cost per acre. We have tried to devise methods of keeping some growing stock on the land without having to make substantial investments of new capital. Unfortunately, this does not necessarily give us the sort of forest investment that we need.

Practices designed to give us the minimum cost *per acre* are rarely those which will give us minimum cost *per thousand board feet of final yield*. For sound investment, we must think in the latter terms rather than the former. The "haywire" sawmill provides a good illustration of the point involved. Such a mill, put together from spare parts and odds and ends, usually represents a minimum of initial capital investment. But its operating and maintenance costs are much higher than those of the well designed, well built sawmill. Because of these higher operating costs the "haywire" mill is a poorer investment than a mill requiring more initial outlay.

If the investment in timber growing should be aimed at getting the lowest cost per unit of yield, we may need to reconsider the notion that the most economical way to grow timber is that which requires the least investment per acre. Here in California, the overhead costs of fire protection and road development are abnormally high. The only way in which such costs can be minimized is by increasing the yield per acre. This means additional initial investment in growing stock, over and above what can be obtained by extensive methods of forest practice. The experience of foresters in the South and in the Pacific Northwest appears to confirm this suggestion that fairly intensive methods, and hence substantial initial investments in growing stock, may be the best means of growing timber at the lowest cost per board foot of yield.

One further point is suggested if we look at the growing stock situation as an investment problem. In the past, light selection methods of cutting have sometimes been popular because they provide a means for securing the maximum possible recovery of volume from decadent old-growth stands, and because they do not require large additional capital outlays at the present time. Although such cuttings may serve to extend the life of our remaining old-growth, they ignore what seems to be an equally important problem—that of converting the old-growth forest into the sort of capital plant which we need. Even when such methods of cutting lower current losses, we ought to make sure that, in using them, we are not throwing away our cheapest and most economical chance to get the kind of capital plant which will be in greatest demand in the future. There comes a time in the life of every automobile when it is more economical to junk it and buy a new one, rather than to try to prolong its life by additional investment in maintaining it. It is important to recognize when this point has been reached in the forest, just as it is in the case of the car.

It seems to me that the question of how well California timberlands will bridge the gap 40 years hence depends very largely on how well we analyze the current problem of investment in timber growing stock, and on how successful we are during the next decade or so in adopting woods practices which reflect sound investment policies.

Five Years of Sustained-Yield Operation[1]

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One of the several large forest management demonstrations established jointly by the Tennessee Valley Authority and state forestry divisions is owned by the Hassell and Hughes Lumber Company, Collinwood, Tenn. The author helped set up this demonstration and here reviews what has occurred during its first five years of operation.

DURING RECENT YEARS much has been heard about the increasing number of forest products industries that are changing from a cut-out-and-get-out type of operation to one of sustained productivity based on scientific appraisal of the forest resource. With a few notable exceptions, however, little or nothing has been said about the problems encountered in the process, nor about how these problems were met. This is the story of one such company, the Hassell and Hughes Lumber Company, Collinwood, Tenn. It summarizes the company's first five years' experience under sustained-yield management.

When Hassell and Hughes started business in 1939, they operated a concentration yard and a planing mill. They bought rough lumber from portable mills and produced about seven million board feet of finished pine boards each year. Early in 1943 they purchased 49,000 acres of cut-over and burned-over land typical of the Highland Rim country and went to work on it without any kind of harvesting plan. There was little coordination between woods production and plant requirements. Small portable mill operators in the area cut company-owned stumpage under contract and delivered the lumber to the plant at Collinwood. Following the usual practice in the area, the operation was virtually a clearcutting of pine. Hardwoods for the most part were left untouched.

After a few months of this, the owners realized they were slowly cutting themselves out of business. They faced these alternatives: cut the remaining timber and quit, or attempt a readjustment that would get them on the road to permanent production. Could they, within their physical and financial means, practice sustained-yield forest management on 49,000 acres of heavily cut-over land? Looking for an immediate answer to this question, company officials sought the advice and assistance of public agency foresters. Together, the Tennessee Division of Forestry and the TVA Division of Forestry Relations made an inventory of the situation.

The Inventory

Analysis of the inventory data indicated a total merchantable stand of 81 million board feet, an average of 1,660 board feet per acre. About 26 million board feet was pine and 55 million board feet was hardwoods.[2] In the pine type only two age classes, reproduction and the 50-year class, were present in significant quantity. If unrestricted cutting were continued, all merchantable pine would be gone in 6 years. The hardwoods were of poor average quality. Only 20 percent of the total hardwood volume was in trees over 14 inches d.b.h. and most of these were of low quality. Many of the smaller trees were fire-scarred or otherwise defective. Much of the area had less than eight hundred board feet of "cut" timber per acre, but there were enough tracts with higher volumes to sustain a logging operation.

The growth rate of the whole timber stand averaged 122 board feet per acre per year with no cutting. If cutting were done selectively, it was estimated that a net growth of 108 board feet per acre per year might be expected, 60 board feet for harvest and 48 board feet for growing stock. Growth rates of the different components of the stand are shown in Tables 1 and 2.

TABLE 1.—AVERAGE ANNUAL GROWTH PERCENT OF CUT AND LEAVE TREES—1943

Species	Cut trees	Leave trees
Pine	4.0	9.6
Hardwoods	3.3	12.7
Pine and Hardwoods (Weighted Average)	3.5	11.0

The low volume of growth was due to understocking. The only way to remedy it was to build up the reserve growing stock. This meant restricting the cut in amount, species, and location.

TABLE 2.—TEN-YEAR DIAMETER INCREASE BY SPECIES

Species	Diameter increase
	Inches
Poplar	2.14
Gum	1.84
Pine	1.74
Red oak	1.64
White oak	1.62
Beech	1.56
Chestnut oak	1.50
Hickory	1.06
Post oak	1.04
Miscellaneous	1.76

The Management Plan

On the basis of these findings, a plan covering the first 13 years of sustained-yield management was jointly developed by the company and public agency foresters. Briefly summarized, the plan recommended: intensified forest fire protection; control over cut by volume, species, and location; intensified and more diversified processing; consolidation of holdings; and some capital improvements.

Fire was the most urgent and serious woods problem confronting the company. Each year some eight percent of its land burned over. Despite this, the fire problem was one of the easiest to solve. The company took an active part in establishing a county forest protective association of landowners and in raising funds to supplement state fire control of landowners and in raising funds to supplement

[1]Presented at a meeting of the Kentucky-Tennessee Section, Society of American Foresters, Cumberland Falls, Ky., October 29, 1948.

[2]Through subsequent acquisition of an additional 25,000 acres, cruised by a consulting forester, the total stand has been built up to 112 million board feet—33 million board feet of pine and 79 million of hardwoods.

state fire control funds. It actively supported the state's fire prevention program and thus helped generate the public interest which finally led to an appropriation of county funds for fire control late in 1943. With this additional money the Tennessee Division of Forestry soon got on top of the fire control job. Today less than one-half of one percent of the 378,000 acres of woodland in Wayne County burns each year.

Control over cut emphasized removal of the low-grade, slow-growing trees, these growing at an average rate of 3.5 percent. Naturally the 11 percent trees were to be left.

The first cutting cycle is actually a "clean-up" operation designed to put the woods in shape to grow good timber. The exact amount to be cut each year is not of critical importance, so long as no more than 50,500,000 board feet is removed prior to 1956. The amount cut from each tract or compartment is important, however; so a cutting budget was established for each tract. No cutting is done in those tracts having a "cut" volume of less than 800 board feet. Since the land was understocked and the trees were of poor average quality, careful selection of species to be cut was essential. Cutting rules were established for each of the types recognized in the initial inventory. The recommended cut by species and actual cut for the past five years are shown in Table 3. This constructive improvement harvest has covered approximately fifteen thousand acres to date.

Excution of the Plan

While the management plan calls for an average annual cut of 350,000 board feet of pine and 4,200,000 board feet of hardwood, the actual average annual cut from company lands has been 514,000 board feet of pine and only 1,111,000 board feet of hardwoods. An additional 386,000 board feet of pine and 1,717,000 board feet of hardwoods has been obtained annually from other sources.

The silviculture being practiced in the woods is generally good. Marking is done by a practical woodsman who was given some initial training by the foresters. There are several reasons why the company has not adhered strictly to the recommended cutting budget. In the first place, buying logs and lumber from other sources has permitted a "sweetening up" of the over-all quality of the lumber processed. While this practice has helped the company financially in this period of adjustment, it has also slowed up and lengthened the initial cutting cycle. It means a longer wait for the resumption of a balanced pine-hardwood operation on its own lands.

Market pressure has also exerted considerable influence on the character of the cut. This factor might have been minimized if the company had been more aggressive in seeking out markets for low-grade hardwoods. Instead of buying 1,700,000 board feet of hardwood lumber each year, the company could have cut this much and more from its own lands. As pointed out earlier, 50,500,000 board feet should be cut by 1956. This goal can not be reached unless the rate of cutting on company lands is stepped up.

TABLE 3.—RECOMMENDED AND ACTUAL FIVE YEAR CUT

Species	Recommended Percent of cut	Actual Percent of cut
Oaks	56.0	59.3
Hickory	26.0	14.3
Pine	8.0	14.6
Gum	4.0	5.5
Beech	2.2	1.0
Poplar	1.2	3.1
Maple	1.6	0.0
Miscellaneous	1.0	2.2
	100.0	100.0

The plan specified an order of cutting for the various compartments. However, to avoid a heavy labor turnover, the company found it expedient to alter the order of cutting to satisfy the wishes of its contract operators. The contractors objected to moving to a new tract a couple of miles away when there was timber close at hand that could be had without moving. Much of this confusion was attributable to the absence of a woods supervisor, who could work with the mill operators and plan an orderly cut. Such a man is now on the payroll and the 10 contract mills are cutting according to plan.

At first the change-over from pine to low-quality hardwoods manufacture seemed impossible. The very nature of the raw material prevented continuation of customary processing methods. Careful analysis of the physical and capital resources, however, revealed no problems that could not be solved through normal manufacturing and marketing procedures. The company already had a dry kiln, molder, table saws, and associated equipment. Addition of a doweling machine and a few small cut-off saws put it in the small dimension business. Intensification of manufacturing processes was possible despite the loss of normal outlets during the war. Bomb lug protectors, pallets and side-matched flooring were manufactured from the hardwoods. When war orders ceased, the company converted to production of chair rounds, ladder rungs, binder slats, pitman rod blanks, surveyor stakes, and other small hardwood items. Outlets for these products had to be sought, but finding them was not too difficult.

In 1943, the company owned 48,935 acres in 62 separate parcels scattered over the central and western portion of Wayne County. During the past five years the total holdings have been increased to 75,878 acres, but the number of parcels has been cut in half. This consolidation of company holdings has made administration and protection easier. Logging chances have been improved and the cost of access roads has been materially reduced. Many of the smaller, isolated tracts have been sold to suit the convenience of local residents, without due regard for the management plan. Blocking up is continuing, but in general it is not too detrimental to the long-term program. The money from sales has helped pay part of the cost of marking property lines. By accommodating local people the company has built up good will that may more than offset the loss of timber. For example, range burning, once a serious problem on com-

pany lands, now causes little trouble. So far, capital forest improvements have been few. Boundaries have been marked, a few trees have been planted, and culls on a few acres have been girdled.

Results

Today the Hassell and Hughes Lumber Company is conducting a sustained-yield operation. Credit for the progress belongs to both the professional foresters, whose analyses were sound, and to the practical woodsmen and businessmen who absorbed and applied the technical recommendations. Local county officials, recognizing the value of this long-range management program in the economic development of the county, have been fair and sympathetic in taxation assessments.

In 1942 the company employed 80 men, had an annual payroll of about $100,000, and processed some seven million board feet of pine lumber which sold for an average price of $35 per thousand. Today the company provides employment for 130 men and has an annual payroll of approximately $200,000. It now produces only 4.5 million board feet annually; but through more complete processing, it has increased its average sale price to $95 per thousand. It now maintains a lumber inventory of about two million board feet. In 1942 the company was on its way out of business; today it sees its lands becoming more productive year by year.

Relation Between Soil Characteristics and Site Index of Loblolly Pine in the Coastal Plain Region of Virginia and the Carolinas[1]

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The harvest of forest management can be foretold only by a knowledge of the productivity of the land. The soil factors affecting the growth of agricultural crops are well understood but the influence of soil properties on the growth of forest stands is obscure. This article describes a method for estimating the site quality of loblolly pine lands of the southeastern coastal plain region in terms of the permanent features of the soil profile.

The productivity of land is an important factor in the management of forests. The amount and quality of timber that may be grown upon a given acreage is dependent upon the characteristics of the site. Site quality may be mapped directly where forest stands are present. Where the timber has been harvested, or where former agricultural land is now being converted to forestry, it is not possible directly to ascertain site quality. The soil, its profile, and its relation to topography are the guides available to the forest manager for the selection of new areas for tree production, for determining priorities in planting programs, for planning cutting cycles, and for the recognition of submarginal forest land as such.

Physical properties of the soil profile generally have been shown to affect forest tree growth. The studies made by Auten (*1* and *2*) on the growth of yellow poplar and black walnut in the Central States, and by Coile (*3*) for loblolly and shortleaf pines growing in the lower Piedmont region of North Carolina, indicate that the depth of surface soil horizons affect forest tree growth. The texture of the upper soil horizons and total amount of "colloidal" matter in them have an influence on growth (*4* and *5*). The permeability, plasticity, thickness, and mottling of subsoil horizons have been shown to influence the growth of forest stands (*2*, *3*, and *8*). Variation in the level of mineral nutrients, generally, has not been shown to affect growth as greatly as differences in the physical properties of the soil.

The Region

The coastal plain extending from central Virginia to upper South Carolina has a uniform climate. Yearly precipitation averages slightly less than 50 inches. Two hundred frost-free days may be expected each year.

The parent materials for coastal plain soils were transported by water from the Appalachian Mountain and Piedmont Plateau regions and deposited on the ocean bed. A number of geologic uplifts raised the ocean bed to form a series of terraces, the present land surface of the coastal plain. The upper or western terraces are old and high and show strong topographic development. The seaward or eastern terraces, being younger, are less well developed topographically.

The more mature soils are associated with well-developed topography. Such soils, the Norfolk, Craven, and related series, occupy large areas in the upper coastal plain and smaller areas on the higher ground of the middle and lower plains. Dunbar, Lenoir, and related series are of greatest extent on the central terraces and occur on poorly drained areas of the upper terraces and better drained land of the seaward terraces. The lower plain contains large acreages of Portsmouth, Bladen, and related series. These occupy smaller areas of poor surface drainage on the central and upper coastal plains. The conditions of surface drainage, excellent, imperfect, or poor, serve

[1] From a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate School of Arts and Sciences, Duke University, Durham, North Carolina. This study was conducted under the direction of T. S. Coile and F. X. Schumacher of the School of Forestry, Duke University.

as a key (*6*) to the identification of soils and topography.

Loblolly pine (*P. taeda* L.) is the most important commercial tree of the region. It occurs in pure stands or mixed with various hardwoods and Virginia, pond, longleaf, slash, and (rarely) shortleaf pines. Small, individual stands of pure loblolly pine are remarkably uniform in age and in the total height of dominant and codominant trees.

Field and Laboratory Methods

Observations for this study were provided by 202 circular plots, one-fifth acre in area, enclosing a single soil type and a well-stocked and even-aged stand of loblolly pine exceeding 28 years in age. The distribution of plots by states and age classes is presented in Tables 1 and 2. Heights of six dominant or codominant trees were measured with an Abney level. Mean stand age was determined from borings taken from four of the trees measured for height. All trees exceeding 5.5 inches breast height were tallied by one-inch diameter classes.

The soil profile was described with respect to texture, structure, consistency, color, and mottling of the horizons. Soil samples were obtained from four post holes. Individual samples were composited. The depth of horizons was obtained at twelve points, spaced to represent equally the plot area.

The air-dry composite samples were prepared for analysis by fragmentation with a rolling pin and by sieving through a 2 mm. screen.

TABLE 1.—DISTRIBUTION OF PLOTS BY STATES

State	Number of plots
Virginia	61
North Carolina	103
South Carolina	38
Total	202

TABLE 2.—DISTRIBUTION OF PLOTS BY AGE CLASSES

Age class	Number of plots
29 - 40	46
41 - 50	79
51 - 60	44
61 - 70	20
71 - 80	8
81 plus	5
Total	202

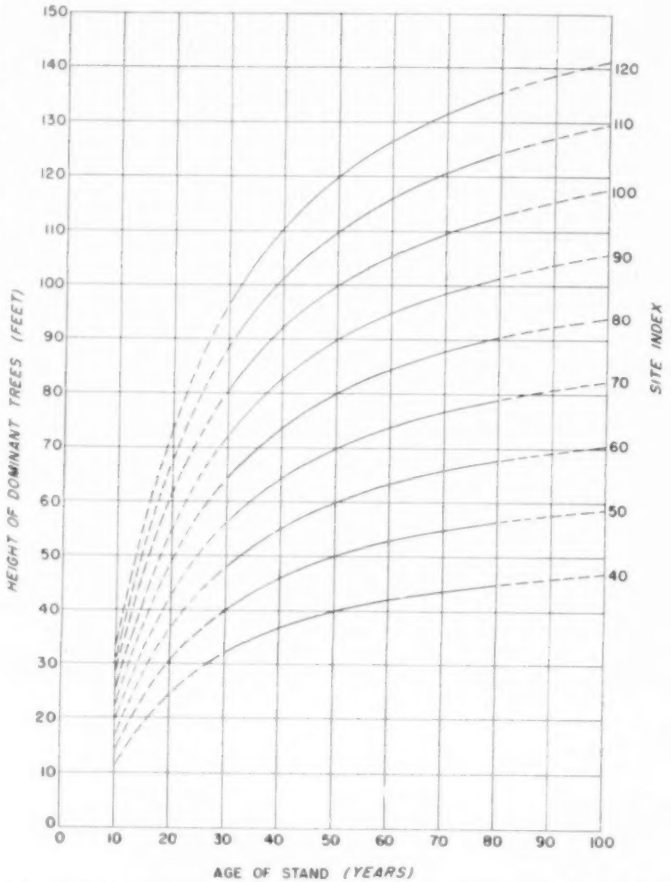

Fig. 1.—Site index curves for loblolly pine growing in the coastal plain region of Virginia and the Carolinas.

Rolling was kept to a minimum. Small samples for analysis were withdrawn from the entire sample by quartering. Moisture and xylene equivalents were determined by the method employed in the Forest Soils Laboratory of Duke University. Imbibitional water, as discussed in this paper, is the percentage difference between the moisture equivalent and xylene equivalent (water basis).

Analysis of the Data

Several questions are individually treated in the following analysis: Are the site index curves for loblolly pine as reported in Misc. Pub. No. 50 (*9*) preferable to the curves supplied by the data themselves; do site index curves vary in their mean and shape over broad changes in topography; do soil properties affect the growth of loblolly pine; if the properties of the soil do affect growth, is the effect of these soil characteristics similar for groups of soils, and what is the magnitude of the error when site index is estimated from soil properties?

The site index equation computed from these data (based upon mean height of dominants and codominants at the age of 50 years) is:

$$\log \text{site index} = \log \text{height} + 7.110 - \frac{.142}{\text{age}} \qquad \text{Eq. (1)}$$

The above equation is developed in

Fig. 1, and is compared with the mean curve from Misc. Pub. No. 50 in Fig. 2. Because the data obtained in the course of this study are more numerous, more restricted in geographic range, and not heavily weighted by observations on very young stands, they will be used in the subsequent analysis.

To detect variation in the shape of site index curves with changes in topography, the data were grouped after the classification scheme of Lee (*6*) into three surface drainage classes: Well, imperfectly, and poorly drained soils. Statistical tests showed that the mean level of site index was different in each of these topographic classes but that the shape of the curves was identical for the three classes (Table 3, Fig. 3).

Schumacher (*7*) suggests that the volume growth of loblolly pine may be described by an equation whose independent variables are the reciprocal of age, the site index, and the ratio of site index to age. By allowing height growth to replace volume growth, and by using soil characteristics to replace the site index term, the expression may be adapted for statistical investigation of the significance of soil characteristics. A preliminary, graphic analysis showed that depth to the least permeable horizon and the imbibitional water value of the least permeable subsoil horizon gave greatest promise as independent variables for the estimation of site index.

Table 3.—A Test for Differences Existing in Height over Age Curves for Loblolly Pine Growing on Well, Imperfectly, or Poorly Drained Sites

Source of variation	D.F.	M.S.	Obs. F
Between individual topographic means	2	0.039067	14.77[1]
Between individual topographic regressions	2	0.000023	1.15[2]
Residuals from individual topographic regressions	196	0.002645	

[1]Significant at 1 percent level.
[2]Significantly close to zero difference at 1 percent level.

The estimates of site index based upon the reciprocal of depth to least permeable horizons and the imbibitional water value of the least permeable subsoil were partially successful. However, it appeared that these variables operate in concert rather than independently. This trend was exploited by employing the sum and difference of the logarithms of each of the independent variables: transformed, these variables become logarithm depth plus (or minus) logarithm imbibition water values. A reanalysis of the data as a whole showed a very significant regression of site index on the logarithmic form of these variables.

Individual regressions were prepared for each of the three classes of soils based upon surface drainage. The individual regressions, except for the soils of poor surface drainage, were significant with respect to the coded logarithmic sums of the depth to the least permeable horizon and the imbibitional water value of the least permeable horizon. The logarithmic difference, as an added effect, was not significant. The poorly drained soils were subdivided, following the classification of Lee (*6*), according to the plasticity of the subsoil. The site index for poorly drained soils underlain by a friable subsoil is significantly related to the reciprocal of the depth to the least permeable horizon. The poorly drained soils characterized by plastic subsoils followed the relation previously shown for well and imperfectly drained classes of soils. When the individual regressions are compared for the purpose of discovering differ-

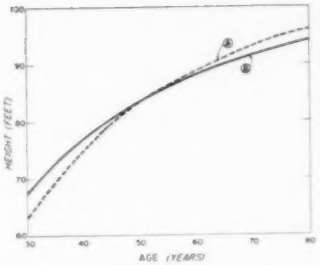

Fig. 2.—Height age curves for loblolly pine. Curve A is from U. S. Dept. Agric. Misc. Pub. No. 50. Curve B is from Equation 1.

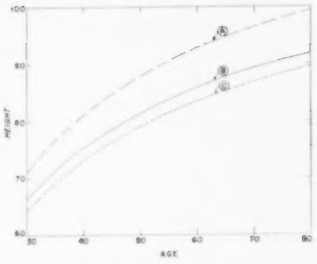

Fig. 3.—Height age curves for loblolly pine by surface drainage classes. Poor surface drainage (A), imperfect surface drainage (B), good surface drainage (C).

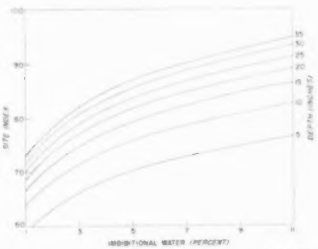

Fig. 4.—Estimated site index of loblolly pine for soils of good or imperfect surface drainage (Eq. 2).

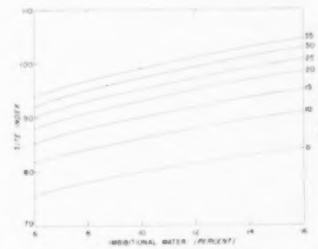

Fig. 5.—Estimated site index of loblolly pine for soils of poor surface drainage and plastic subsoils (Eq. 3).

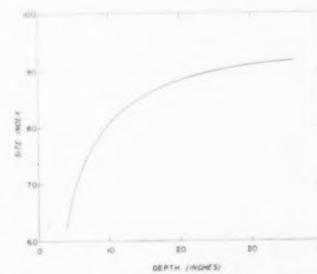

Fig. 6.—Estimated site index of loblolly pine for soils of poor surface drainage and friable subsoils (Eq. 4).

ences among them, it is found that a single equation describes site index for the good or imperfectly drained soils,

$$\log \text{site index} = 1.692 + 0.110\,(\log \text{depth} + \log \text{imbibition}) \qquad \text{Eq. (2)}$$

that a second equation differing from the preceding by a constant describes site index for poorly drained soils with plastic subsoils,

$$\log \text{site index} = 1.715 + 0.110\,(\log \text{depth} + \log \text{imbibition}) \qquad \text{Eq. (3)}$$

and that a third equation, of different form, describes site index for soils of poor surface drainage and friable subsoils,

$$\log \text{site index} = 1.983 - \frac{0.772}{\text{depth}} \qquad \text{Eq. (4)}$$

The foregoing equations appear as families of curves in Figures 4, 5, and 6. Estimates of site index based upon Equations 2, 3, and 4 may be expected to be ten percent in error.

Discussion

The results of the analysis can be simplified for practical use by the forest manager. Table 4 has been prepared to show observed mean site indices by soil series and surface drainage classes. Without the benefit of measurement nor the help of soil maps, land can be classed by its surface drainage. Land of poor surface drainage, pocosins excepted, is of significantly higher quality than better drained land. Because poorly drained land is proportionately more frequent in the lower coastal plain, site quality is generally higher in the lower than middle or upper coastal plain. Precision in the estimate of land quality can be gained where soil series are recognized or where suitable soil maps are available. The Craven series, among the well drained soils, tends to be superior to the Norfolk series and both are of much higher quality than dune sand. The imperfectly drained soils are not superior to the better drained soils but among the imperfectly drained soils the Leon series is very inferior to the Dunbar, Lenoir, and Moyock series, while the Roanoke series is extremely productive. Mean site indices vary but little among the poorly drained soils despite wide differences in subsoil characteristics. The Coxville, Bladen, and Portsmouth series have a mean site index just below ninety. The Elkton series represented by six observations in these data, appears to be a soil of very high quality.

TABLE 4.—THE MEAN OBSERVED SITE INDEX OF LOBLOLLY PINE BY SOIL SERIES AND THE IMBIBITIONAL WATER VALUE OF THE LEAST PERMEABLE SUBSOIL HORIZON

Soil Series	Number of observations	Mean observed site index	Mean imbibitional water value
Well drained soils:			
Norfolk	37	80	3.6±0.34
Craven	14	82	7.4±0.59
Others	9	75	
Imperfectly drained soils:			
Dunbar	20	80	6.4±0.34
Lenoir	12	83	9.2±0.73
Moyock	12	86	7.4±0.51
Onslow	4	76	6.7±1.16
Scranton	4	89	1.6±0.36
Atlee	3	82	5.2±0.24
Leon	2	59	1.7±0.41
Roanoke	2	102	11.5±0.19
Others	2	82	
Poorly drained soils:			
Plastic subsoils:			
Coxville	19	89	10.5±0.78
Bladen	17	88	10.0±0.72
Elkton	6	95	11.5±0.74
Bayboro	2	88	8.8±0.43
Friable subsoils:			
Portsmouth	29	89	5.1±0.25
Fallsington	5	84	6.5±0.68
Others	3	75	

Greater accuracy in estimates of site index can be attained if depths to the subsoil, or more accurately, to the least permeable subsoil horizon are measured. Measurement can be accomplished by means of a soil auger. Table 5 supplies estimates of site index for the more frequent soil series by depth classes. This table has been constructed by use of Equations 2, 3, and 4 with the imbibitional water value for each series at its mean. A final gain in precision is possible if measurement of the imbibitional water value of the subsoil can be made. It is not felt that this final gain in precision is likely to compensate for the field and laboratory effort necessary for its fulfillment. Mean imbibitional water values for some of the coastal plain series are given in Table 4.

Aside from the practical use of these data, it is noted that the results are in partial accord with site quality studies made upon loblolly pine growing in the lower Piedmont Plateau. Coile (*3*) found that site quality decreased with increasing imbibitional water value of the subsoil; this situation is reversed in the coastal plain. The differences in the geological history and the water regime of the Piedmont and coastal plain offer several clues to the change in trend. The well drained soils of the coastal plain, because of their topographic position, may be compared with Piedmont soils. Among the well drained soils, subsoils are relatively permeable to water (and root) movement when compared with the majority of Piedmont subsoils. A decrease in subsoil permeability in these soils of the coastal plain prevents rapid internal drainage and increases the net availability of water in both the surface and subsoil horizons. Piedmont soils are generally found to have a much thinner mantle of surface soil and to have a less permeable subsoil. Under the latter circumstances, retarding the movement of water may lead to its dissipation by surface runoff and subsurface flow with no increase in its net availability. The lower permeability of Piedmont soils also may seriously limit the development of roots in subsoil horizons while the range of permeabilities observed in the well drained coastal plain soils may not strikingly reduce root extension.

TABLE 5.—ESTIMATED SITE INDICES FOR LOBLOLLY PINE

Depth to least permeable horizon inches	Soil Series							
	Norfolk	Craven	Dunbar	Lenoir	Moyock	Coxville	Bladen	Portsmouth
6		75	74	77		82		
8		77	76	79		85	84	
10		79	78	81	79	87	86	
12	75	81	79	83	81	88	88	83
14	76	82	81	84	82	90	90	85
16	77	83	82	85	83	91	91	86
18	78	84	83	86	84	92	92	87
20	79	85	84	87	85		93	88
24	80	87	86				95	89
28	82							90
32	83							91
36	84							92

Summary

Site index curves have been prepared for loblolly pine growing in the coastal plain region of Virginia and the Carolinas. It has been shown that these curves are similar in shape for all classes of topography, but that mean site index is higher on land of poorer surface drainage than land of better surface drainage. Physical soil characteristics of the depth to impermeable subsoil horizons and the imbibitional water value of the least permeable subsoil horizon affect the growth of loblolly pine. The effect of these soil characteristics on site quality has been quantitatively described. It is found that one equation describes the regression of site index upon the depth to the least permeable subsoil horizon and the imbibitional water value of that horizon for soils of good or imperfect surface drainage. A similiar equation, varying from the first by a constant, describes site quality for those poorly drained soils having plastic subsoils. A third equation, varying in form from the others, describes site index in terms of the depth to the least permeable horizon for those poorly drained soils having friable subsoils. A practical method for applying these results in forest management has been outlined.

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Recent Experiments in Administering and Charging for Camping and Picnicking Privileges on the National Forests[1]

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A NEWS ITEM on January 12, 1949 to the effect that the Forest Service was going to charge for the use of recreational facilities on an experimental basis, starting at the beginning of the 1949 vacation season, was carried in the leading newspapers of the nation. The announcement was not important enough to command headline space, and to many it went entirely unnoticed. However, the item was received by local forest visitors with some concern and with mixed feelings.

"Why is the Forest Service suddenly charging for the use of improved camp and picnic areas when for over forty years they have been free?" has been a question quite frequently asked of rangers, supervisors, and even regional foresters. To answer this question, and the many others that have been asked in connection with the new charge policy, it is necessary to look into the recreation situation in the national forests.

Most of the recreation facilities in the national forests were constructed by the Civilian Conservation Corps during the 1930's. Rustic tables, fireplaces, foot bridges and toilet facilities have a normal life expectancy of from 10 to 20 years. During the war, maintenance and development work in this field were largely suspended. Many of these improvements have now passed their life expectancy and are deteriorating from use and exposure faster than they can be replaced or maintained with the limited funds now available. Recreational use of the national forests is growing steadily, many popular areas are regularly overcrowded, and the problem of maintaining essential sanitation and fire protection on all areas is becoming increasingly difficult.

Congressional Mandate

Except during the years when relief labor and funds were available, the Forest Service has been doing its recreation work through annual appropriations. For the fiscal year 1948 the Pacific Northwest Region of the Forest Service received only about seventeen percent of the funds needed to handle properly its recreation program. Each year there are Appropriation Committee hearings, and the following is quoted from the Report of the Committee on Appropriations of the House of Representatives on the Department of Agriculture Appropriation Bill, Fiscal Year 1950:

"One of the activities of the Forest Service requiring considerable amounts of money is that of the construction and maintenance of facilities in recreation areas on the national forests. The committee be-

[1] Presented at a meeting of the Division of Forest Recreation, Society of American Foresters, Seattle, Wash., October 12, 1949.

[2] Any views expressed herein are those of the author and not necessarily those of the U. S. Forest Service.

lieves it is entirely possible, as well as right and proper, that the Forest Service should impose a schedule of charges upon those using the national forest recreational facilities sufficient to offset the expenditures required for the construction and maintenance of the facilities. The principle of requiring the recreationist to pay the cost of services incident to his use of the facilities is recognized, and such requirements are imposed and enforced in many places in the Forest Service. The committee has been importuned year after year to provide increased appropriations for the construction and maintenance of these recreational facilities. There would be greater disposition to make increased appropriations for this purpose if the plan of collecting fees or charges from the users of the facilities were more universally applied so that the appropriations for the purpose would be offset by receipts going into the Treasury."

To comply with the wishes of Congress this year, the Forest Service decided to place a representative group of 46 improved camp and picnic areas on a charge basis, 20 to be managed by Forest Service personnel and the remainder put under management of permittees. Since there are over forty-five hundred camp and picnic areas in the national forests, this means that, roughly, one percent of the areas were affected by the charge policy, but because these areas were the larger ones, they represented about eight percent of the capacity of all recreation areas.

The purpose of carrying out these "pay for" recreation use experiments therefore was to find out from an administrative standpoint how feasible this program is and how it will affect our over-all program of national forest administration. If these experiments caused additional fire and sanitation problems by forcing people to go to undeveloped areas, we certainly wanted to know it. Also, we wanted to test the public reaction to paying for camping and picnicking privileges.

Areas and Charges

It is too early to draw any definite conclusions regarding the charge policy, because all regions have not completed the experiment and sent their reports to our Washington office where they will be analyzed. If the findings are not conclusive enough, the experiment may be continued another year.

In selecting the areas for the charge experiment in the Pacific Northwest region, we tried to pick those which stood at least an even chance of returning more in the way of receipts than the cost of supervision and maintenance. We found it desirable, for comparison purposes, to have a few permittee-operated, Forest Service-operated and free areas within competing distances of each other so that trends of users' preferences could be observed. At permittee-operated areas we required the permittees to keep the areas neat and clean, dispose of garbage currently, maintain the improvements and furnish firewood in random lengths free of charge. All toilets were to be policed as often as required, and toilet paper furnished by the permittees. In this region permittees were not allowed to operate stores furnishing campers supplies, in order to make the operation of the campgrounds pay. Also in this region, the permittees were given free use permits, but they were required to secure a minimum of $5,000 public liability insurance against accidents by users.

Forest Service-operated charge areas were maintained to the same standards required of permittees. Forest Service employees were on duty only 40 hours a week, so complete supervision and collections were lacking on 2 days each week. In general, the 2-day layoff was taken in midweek when recreation use was low. Forest Service attendants were required to perform maintenance work on other recreation areas, so all of their on-duty time was not spent in the charge areas. These points are mentioned because it is quite likely that some campers and picnickers used the Forest Service-operated areas without being charged. On the other hand, the permittee would be inclined to charge every party that he could and therefore the use figures for the permittee-operated areas are considered a little more accurate than for the Forest Service-operated areas.

Charges for picnicking and camping were the same for both Forest Service- and permittee-operated areas. For camping the charge was 50 cents per night, or $3.00 per week for each car party of not over 6 adults. For picnicking a charge of 25 cents per day was made for each car party of not over 6 adults. For both camping and picnicking, no charge was made for children under 12 years.

There were 10 charge areas in operation in this region this year. Five forests in Oregon and 2 in Washington participated in the experiment. The Mt. Hood, Siuslaw and Snoqualmie forests had two charge areas each, one of which was permittee-operated and the other Forest Service-operated.

Costs and Returns Compared

The 4 Forest Service areas were operated between June 25 and September 5, and received a total of 2,803 picnic parties, 2,518 overnight camping, and 77 weekly camping parties. Total receipts from all Forest Service-operated areas were $2,190.75.

Sampling cost studies were made at Paradise Forest Camp on the Willamette and Tollgate on the Mt. Hood, where receipts were $715.75 and $542.75, respectively. At Tollgate the recreation guard, or attendant, spent a total of 247½ hours collecting fees and issuing use permits. Thirty-six hours more were spent during the period making out time reports, reporting and transmitting collections. This left only about one-third of the guard's time for maintenance and clean-up work.

In general recreation guards spent so much time making collections that they had little time left to do the customary maintenance work on adjacent campgrounds. Accordingly, adjacent campgrounds suffered, and at least in this region there is every indica-

tion that manpower will be wasted whenever Forest Service personnel are used to operate charge areas.

The operating cost figures have not been thoroughly analyzed, but it is my belief that the fees collected in the Forest Service-operated areas will barely pay for the extra work involved in making collections.

The 6 permittee-operated areas received a total of 2,692 picnic parties, 2,094 overnight camping, and 11 weekly camping parties. Total receipts from the permittee-operated areas were $1,753.25 for the season. This amounts to $146.00 per month per permittee for wages and operating expenses. In most cases the fees collected were not considered enough to pay a reasonable salary to permittees who operated their areas as separate enterprises. As a result, it is not likely that permittees can again be obtained for some of the areas used this year.

In most of the charge areas from one to ten percent of the users complained about the charge idea. On the Snoqualmie, 700 car parties were estimated to have driven into one area, noticed the charge sign, and departed. The used figures for this area show that two-thirds of the car parties entering it turned away. This is an exceptional case, for there are a number of competing free campgrounds in the vicinity. It was also interesting to note that 75 percent of those actually using this particular area returned to it later in the season. Their reason for this was that they had found charge areas better supervised and cleaner, and fuel wood was always available to them. In this region we observed that, regardless of the charge status, recreation visitors appreciate clean, orderly campgrounds, and will usually show more respect for them by keeping them cleaner than those which they find in disrepair.

It is my belief that this region has about a dozen camp and picnic areas which might be operated permanently by permittees on a charge basis to the benefit of all concerned. These are larger developed areas receiving heavy use, adjacent to resorts. If they were operated in connection with the resorts, they should provide a reasonable revenue to the operators for the effort involved. Maintenance by a permittee would relieve the Forest Service of this expense, and the public would be assured of better services than would normally be possible if operated free. But even if this number were operated on a charge basis, maintenance of the remaining 1,100 campgrounds in this region would have to be financed from other sources.

Although no ski area in the national forests has been placed on a charge basis, such a possibility was presented by the National Ski Association to its member clubs last fall. To the question "What would be the reaction of your skiers to a proposal that Congress authorize federal bureaus to collect fees for use of improved recreation facilities—the receipts to go directly into a fund for maintenance, new construction and administration of the areas?"—the National Ski Association was surprised to find that 47 of 62 of its member clubs reporting were in favor of such fees. Skiers apparently are not adverse to paying, providing they receive direct benefits from the fees. Under existing laws national forest receipts cannot be used for recreation purposes.

A law (Section 500, Title 16, U.S.C.) passed on March 4, 1913, provides that 25 percent of "all moneys received" during each year from each national forest shall be paid to the state in which such national forest is situated. A later amendment to this law provides that 10 percent of "all moneys received" from the national forests within a state during each fiscal year shall be available at the end of such year to be expended on roads and trails within the national forests in such state. Another law allows the Forest Service the right to do timber stand improvement work paid for from moneys deposited by timber purchasers. It is evident, therefore, that the idea of "taking money from its source," as it were, to be used for improving or developing the areas from which received is not new. At the present time there is a bill (H.R. 2419) introduced by Congressman Tackett of Arkansas, which would amend the Act of March 4, 1913 to provide "Ten per centum of all moneys received from each national forest during each fiscal year shall be available at the end thereof to be expended by the Secretary of Agriculture for the development, maintenance, and operation of national forest recreational resources and areas, including wildlife resources." The Report of the House Committee on Agriculture points out that the 10 percent provision of this bill would yield a revenue of approximately $3,000,000 per year on the basis of present national forest receipts. The report further points out that the existing Forest Service appropriation for administration and maintenance of recreation facilities is $1,100,000, and that a more adequate job could be done if this bill were enacted. Proponents of the bill feel that although some revenue can be derived and savings made in maintenance by charging for the use of some recreation areas, the bulk of the funds for the operation, maintenance and development must come through appropriations or through a law which will allow a percentage of national forest receipts to be used for these purposes.

Notes

Training Alaska Wildlife Workers

The Interior Department Appropriation Act for the current year included funds for enlarging the Cooperative Wildlife Research Unit Program. This has permitted establishment of a new unit at the University of Alaska. Dr. Neil W. Hosley, a member of the Society of American Foresters, has been transferred from Washington, D.C., to Fairbanks, Alaska, to serve as unit leader and to train students in the technical aspects of wildlife restoration and management.

Providing these training facilities in Alaska is long overdue. Out of a resident population of 95,000 humans, scattered over a land area more than twice the size of the State of Texas, it has been estimated that 32,000 persons depend wholly or to a very substantial part, on game and fur animals as a means of livelihood. Sharp increases in the human population, the influx of non-resident hunters, and the wide use of airplanes to expedite and facilitate travel into the back country, have stepped up the annual harvest of wildlife. Record numbers of wolves and coyotes are levying an ever-increasing toll. Alarming declines in game supplies have occurred. Fur bearers need attention. The same is true of Alaska waterfowl which produce most of the ducks and geese that wing their way south each fall to Washington, Oregon, and California. The lack of locally trained candidates for employment in wildlife research and management has been a major deterrent to first-class administration of this vitally important natural resource in our northern outpost. Territorial instruction of future wildlife workers will insure a continuing supply of skilled technicians whose education and accompanying field studies have been beamed toward solving Alaska's wildlife problems.

This Alaska wildlife training center increases to 15 the number of educational institutions now receiving assistance. In the states, funds and facilities to support the units are provided by the college or university, the conservation department, the Wildlife Management Institute, and the U. S. Fish and Wildlife Service. These participants administer the training programs through local coordinating committees on which each is represented. The same pattern of financing and administering applies to Alaska, but in that territory the Fish and Wildlife Service doubles for the lacking state conservation department.

Major objectives of these cooperative establishments are (1) to train personnel for responsible positions in the field of wildlife management, (2) to conduct research basic to the proper utilization of these resources; (3) to promote education through such means as demonstrations, lectures, and publications, and (4) to provide technical assistance to state conservation departments and other agencies in their wildlife management problems.

This Cooperative Unit Program was launched in 1935. Graduates totaled 974 at the end of the 1948-49 school year. Availability of these college-trained technicians has been a great boon to the state game departments, particularly in the conduct of Pittman-Robertson program work. Evidencing this is the large proportion of unit graduates now attached to these federal aid projects. Had this ready supply of properly instructed job candidates been lacking many of the outstanding contributions to the restoration and better management of wildlife that have come from Pittman-Robertson project activities could not have been realized.

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Planting Loblolly Pine Outside Its Natural Range

It is well known that loblolly pine has been planted in many parts of the world outside its natural range, but it is not so well known that the species often thrives under conditions quite different from those of its natural habitat. It thrives in a number of countries where the climate is milder than in the southeastern United States, but where moisture conditions may be more erratic. In the United States it has been grown with considerable success more than a hundred miles north of its natural range.

In Australia, along the west coast of Queensland and New South Wales where winters are mild and rain-fall is adequate, loblolly pine has been planted for about 25 years. Seed obtained from these trees is said to have a viability of about 60 percent. In New Zealand the species has been planted since 1906 and its growth rate is comparable to the best sites in its natural North American range. Its latitudinal limit appears to be south as far as Hokitika on the west coast of South Island. It has also been successfully introduced into parts of South Africa and has done well on the Uruguay coast of South America.

In the western United States it has been planted in Placerville, California where 20 year old trees average 37 feet in height. This compares to dominant trees grown in North Carolina on soils with a site class of between II and III. On the whole it is only rarely planted as an ornamental in the western states.

In regions adjoining its northerly and westerly natural boundaries it has been widely planted and continues to exhibit rapid growth characteristics in many of these regions. Growth approximating that of dominant trees on site II in eastern North Carolina have been recorded north and west of the natural range in parts of Tennessee, southern Illinois, southern Indiana, western Kentucky, and central New Jersey. It has been successfully planted to an

elevation of 2,000 feet in Tennessee, although seedlings planted at the same elevation in Henderson County, North Carolina were killed, presumably by low temperature.

In areas still further north, such as Pennsylvania, the species does not do so well. Seedlings grown from seed in Boston died of undetermined cause and it is commonly observed that needles of trees in Ohio and southern Indiana are winter-killed. They turn brown during the summer and are dropped, but new ones are formed and the trees recover. Trees grown in the Missouri botanical garden were reported to be 15 years old and only 13 feet tall, but this may be related to a drier climate as well as to the fact that this is over 200 miles north of its natural range.

Loblolly pines planted far north of the natural range not only suffer from winter-killing but are more susceptible to ice damage and damage by sap-suckers than native pines. Whether winter-killing is caused by dessication of the leaves when the soil is at a low temperature, or whether it is caused by the direct influence of low temperature on the leaves is not known.

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Professor Champion Looks At American Forestry

Professor H. G. Champion has a most interesting article in the September number of the *Empire Forestry Review entitled*, "Sustained Yield Management in Western America." It is based on his visit in August and September 1948 to the West Coast.

The well known and outstanding British forester's observations are both keen and penetrating. He visited the Shelton Cooperative Sustained Yield Unit and found it extremely worthwhile as helping to solve what he observed as the greatest single problem on the West Coast. He is less favorably impressed with the forest management licenses in British Columbia, which he regards as having features not so desirable as the United States plan, mainly that the licensee has to pay all charges for management and taxes for the combined acreage.

He says, "It will take some time to put into practice, the methods that are ultimately adopted over the large areas concerned." The solution is of far more importance than local or national interest, since it involves an important part of the world's timber resources. He takes a hopeful viewpoint, saying that the days of "creaming" the forests are nearly gone, and close and efficient management of the raw material is partly developed in the pulp and paper industry.

It would be helpful if other prominent foresters from abroad were similarly given the opportunity to visit the important timber areas to make their reactions known to American foresters.

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Forest Pest Surveys in the Northeast

In 1949, for the first time in the Northeast, full-scale aerial surveys were made to determine the extent and degree of defoliation by a forest insect. They were made by H. J. MacAloney and associates at the New Haven, Conn. laboratory of the Bureau of Entomology and Plant Quarantine. The area covered included not only the northern part of the spruce-fir region in Maine known to be infested by the spruce budworm, but extended southward to Moosehead Lake and Jackman. The surveys came as a result of the enactment of the Forest Pest Control Act in 1947 and appropriation of funds by Congress in 1949.

Two planes were used. One was a state-owned pontooned Luscombe, operated by a state crew. The other was a high-wing Aeronica monoplane owned by the Caribou Municipal Airport, but hired and used by a federal crew. Late in June it was observed that as little as 25 percent destruction of the 1949 foliage by the spruce budworm, even on individual trees, was visible to the unaided eye at altitudes up to 500 feet along the line of flight. From June 28 to July 9, when defoliation was most apparent, the survey to determine the extent and degree of defoliation was made.

Some preliminary work on aerial photography was done by a Navy photographic unit, flying in a two-motored Beechcraft over the Stockholm-Cross Lake area, where some of the heaviest budworm feeding occurred in both 1948 and 1949. There still remains much to be learned about the use of airplanes in obtaining photographs that will adequately delineate defoliated forested areas. Considerable time will be spent in 1950, therefore, in developing techniques in aerial surveys to tie in defoliation with different forest types and in the use of aerial photography for detecting forest insect damage and spotting it accurately on cruise maps.

In cooperation with the state entomologist of Maine, an intensive ground survey of spruce budworm egg masses was made late in July. Flight maps were used for selection of some of the sampling areas. With the exception of a small area sampled by the state employees near the Quebec line west of Jackman, this egg-mass survey was carried out in the northern part of Aroostook County. Valuable information was obtained concerning the probable 1950 populations, particularly in stands where additional airplane spraying will be carried on.

In August, in cooperation with the States of Maine, New Hampshire, Vermont, and New York, the Bureau of Plant Industry, Soils and Agricultural Engineering, and the U. S. Forest Service a comprehensive ground survey of birches was also carried out. Approximately 120 survey plots were established in hardwood stands from the Penobscot River in Maine to the western slopes of the Adirondack Mountains in New York. All survey crews made gen-

eral observations for evidence of beech scale-Nectria atack.

Plantation surveys were conducted on an enlarged scale. These surveys were made in cooperation with the conservation departments of Massachusetts and New York with the entomology and forestry departments in Connecticut, New Hampshire, and Maine. In the New England States emphasis was placed on the white-pine weevil. In New York, although the presence of weevil and sawflies received attention, the main stress was placed on the European pine shoot moth. This insect is a serious enemy of red pine in plantations, wherever low winter temperatures (-10° F. and lower) do not exert a controlling effect on the hibernating caterpillars. The western counties of New York make up one general area where damage has been severe. There are extensive plantations in this area, and additional planting is contemplated in the future. The purpose of the survey, therefore, was to determine where the insect was most prevalent and whether there were localities where red pine could be planted without danger of severe damage. It began in state-owned reforestation areas in the two western counties along the Pennsylvania line, Chatauqua and Cattaraugus, and was continued eastward as far as possible within the time available.

New York has close to a million acres of forest plantations. As quickly as time and available crews will permit each forest district will be surveyed. In New England, the state organizations can offer tangible cooperation in making plantation maps and records available; and in providing additional crew members or guides to some of the plantations. Plantation surveys will be continued in 1950, and it is expected that Vermont, Rhode Island, New Jersey, and Pennsylvania will be included.

The data from all the 1949 surveys are being analyzed, and preliminary reports will be sent to the cooperating agencies. As data from the forest pest surveys accumulate over a period of years, they will furnish information on the status of forest insects throughout the area, the trends of infestations, and will contribute to the solution of problems concerning the choice of sites for coniferous plantations.

Southwestern Ranges Fifty Years Ago

"On all the Western stock ranges which the writer has visited there have existed many small areas in cultivated fields, unused pastures, fenced railroad rights of way, and similar situations which are in their virgin state or have so far recovered from overstocking as to bear testimony to the original productivity of the soil. Things are far different in large areas of southern Arizona. Here unused pastures are very rare, cultivated fields are fewer in number, and the destruction is so complete that in many localities even the railroad right of way has recovered but little in three or four years' time. On the river bottoms a few indications of luxuriant growths of grass are found, but in nearly every case, even in such favored localities, there is little aside from this evidence, the actual original conditions being very much modified." . . .

"From the evidence given by every old settler no conclusion could be reached other than that of misuse of the range country and that the destruction was greater than in the more favored ranges of the Northwest. How the destruction of the range could be so nearly complete is somewhat beyond the conception of those not familiar with the character of the precipitation, configuration of the land, composition of the soils, and the habits of the forage plants of the region." . . .

So reads the introduction to Bulletin 4 of the Bureau of Plant Industry dated 1901 (this bulletin is made available through the courtesy of Vernon Bostick of the Kaibab National Forest). Special Agent David Griffiths, author of the bulletin, in further efforts to obtain first-hand comparisons of existing and former range conditions, distributed a detailed questionnaire among a number of ranchers and settlers in southern Arizona.

"The answers returned," reported Griffiths, "have been very suggestive and indicate an intelligent, active interest in the questions which are of such vital importance to the stock growers located on the public domain. Two of these, however, appear of such general excellence and indicate such a keen insight into the forage problems that they are reproduced in full."

One of these letters, signed by Col. H. C. Hooker of the Sierra Bonita Ranch, dated December 11, 1900, cited an experience of 35 years in the territory on which he was reporting. "These regions [Santa Cruz, San Pedro, and Sulphur Spring Valley] have been diminished in grazing facilities fully 50 percent in 25 years. The San Pedro Valley in 1870 had an abundance of willow, cottonwood, sycamore, and mesquite timber, also large beds of saccaton and grama grasses, sagebrush, and underbrush of many kinds. The river bed was shallow and grassy and its banks were beautiful with a luxuriant growth of vegetation. Now the river is deep and its banks are washed out, the trees and underbrush are gone, the saccaton has been cut out by the plow and grub hoe, the mesa has been grazed by thousands of horses and cattle, and the valley has been farmed. Cattle and horses going to and from feed and water have made many trails or paths to the mountains. Browse on the hillsides has been eaten off. Fire has destroyed much of the shrubbery as well as the grass, giving the winds and rains full sweep to carry away the earth loosened by the feet of the animals. In this way many waterways have been cut from the hills to the river bed. There is now little or nothing to stop the great currents of water reaching the river bed with such force as to cut large channels and destroy much of the land under cultivation, leav-

ing the river from 10 to 40 feet below its former banks. Thus it has caused much expense in bringing the water to the cultivated lands, and necessitated much labor to dam up the channel and keep the irrigating ditches in repair."

This damage Col. Hooker attributed principally to over-stocking, reporting: "in times of drought even the roots are eaten and destroyed by cattle, while if not fed down or eaten out the roots would grow again with winter moisture. There were fully 50,000 head of stock at the head of Sulphur Spring Valley and the valley of the Aravipa in 1890. In 1900 there were not more than one-half that number and they were doing poorly."

The other letter by C. H. Bayless of Oracle, Arizona, in addition to answering questions, submitted a statement containing a forcible expression of the futility of attempting to control the range without the help of the government or the ranchers. "Permit me to add that no practical plan can well be advanced for increasing plant growth on any open range while free for the use of everybody. Hence I must respectfully urge upon you the importance of impressing the government officials with the fact that no general improvement of range country can be expected until the land is placed under individual control by lease or otherwise. In a few favored spots where such an arrangement is now secured through local conditions good results might be accomplished, but the greater part of our range country is at present a desert and will steadily become less and less productive, while the present range management, or rather lack of it, prevails."

Mr. Bayless, drawing on his 15 years knowledge of San Pedro and southern Pinal County wrote as follows. "At that time [15 years before] 10 animals were kept in good condition where one can now barely exist. However, those 10 animals were then rapidly destroying the vegetation, not making proper use of it."

"About 12 years ago the San Pedro Valley consisted of a narrow strip of subirrigated and very fertile lands. Beaver dams checked the flow of water and prevented the cutting of a channel. Trappers exterminated the beavers, and less grass on the hillsides permitted greater erosion, so that within 4 or 5 years a channel varying in depth from 3 to 20 feet was cut almost the whole length of the river. Every year freshets are carrying away new portions of the bottom lands. At present this valley is sandy waste from bluff to bluff, while the few fields remaining are protected from the river at large and continuous expense. Thus, in addition to curtailing the area of good land, the deep channel has drained the bottoms, leaving the native grass no chance to recover from the effects of close pasturing. It also makes it more difficult to get irrigating water onto the surface of the land.

"Of the rich grama grasses that oroginally covered the country so little now remains that no account can be taken of them. No better pasture was ever found in any country than that furnished by our native grama grasses, now almost extinct.

"The present unproductive conditions are due entirely to overstocking. The laws of nature have not changed. Under similar conditions vegetation would flourish on our ranges to-day as it did 15 years ago. We are still receiving our average amount of rainfall and sunshine necessary to plant growth. Droughts are not more frequent now than in the past, but mother earth has been stripped of all grass covering. The very roots have been trampled out by the hungry herds constantly wandering to and fro in search of enough food. The bare surface of the ground affords no resistance to the rain that falls upon it and the precious water rushes away in destructive volumes, bearing with it all the lighter and richer particles of the soil. That the sand and rocks left behind are able to support even the scantiest growth of plant life is a remarkable tribute to our marvelous climate. Vegetation does not thrive as it once did, not because of drought, but because the seed is gone, the roots are gone, the soil is gone.

"Twelve years ago [1888] 40,000 cattle grew fat along a certain portion of the San Pedro Valley where now 3,000 cannot find sufficient forage for proper growth and development. If instead of 40,000 head, 10,000 had been kept on this range, it would in all probability be furnishing good pasture for the same number today. Very few of these cattle were sold or removed from the range. They were simply left there until the pasture was destroyed and the stock then perished by starvation."

Bernard Frank,
U. S. Forest Service.

Time Now for Silviculture

It has taken fifty years for forest management in America to reach the stage of detailed planning for the systematic organization and management of the timber resource. This involves the formation of working circles and compartments for the inauguration of definite limitation of the periodic cut. In this stage of planning, the purpose is first to assure a sustained yield; second, to increase this yield through intensive silviculture. That this stage has now arrived is shown by the recent management plans conference of U. S. Forest Service officials at Hot Springs, Arkansas, at which the status of management plans in the ten regions of the service was viewed and methods of vigorously prosecuting the work were formulated.

During this period of five decades, American foresters have been struggling with the problem posed by the impact of European systems of regulating the annual cut, and of examples of fully developed and organized forests, upon the raw, undeveloped, inaccessible areas of primeval forest, or the "devastated" tracts of cut over land, to which they fell heir. What should be done? Were they failing in their responsibilities by putting markets, fire protection, roads, grazing, and

a host of immediate problems first, and shoving the ambitious "working plan" of which a few were prepared in the early days, into a pigeon hole to collect dust? It took half a century to realize fully that organized sustained yield management, which is the *sine qua non* of "working plans" was impossible until adequate transportation, markets, and forest protection had materialized. Regulation of the annual cut of relatively inaccessible old-growth forests had to await the time when logging and sales threatened to overcut the forest—or, on the purchase areas, the time when there was enough timber to sell to make control planning necessary.

It was this situation, common to forestry in all countries in the initial stages of development, that caused so many foresters and practical owners in America to condemn the "aping" of European forestry methods, and to belittle the "theoretical" instruction in schools and textbooks which dwelt on the "normal forest" and methods of determining a sustained annual cut—principles that only now in this country are in need of widespread application on the ground.

Unfortunately, this cynical attitude was extended to include the basic scientific principles of silviculture, as worked out in European practice, and which took the form of the so-called silvicultural systems. Because some of these systems were schematic and very intensive in their application, they were also looked on as "impractical" and not adapted to the unorganized forests of America. It was not realized that silvicultural systems are methods of reproducing the forest adapted to the silvical and ecological requirements of each species, and that they constitute the very foundation of sustained forest production.

Efforts to manage the cutting practices in America in order to secure reproduction of the more valuable species have continued unremittingly from the time of establishment of the first national forests down to the present, reinforced by the research conducted by forest experiment stations and other agencies. Very slowly, with many fundamental errors such as the selection system applied to Douglas-fir, we have learned how to secure adequate natural reproduction of commercial species. Yet this field is only partly developed, and we have a long way to go.

Viewed in the light of the last half-century, it becomes evident, first, that the standard forms of silvicultural cutting known as systems (such as clearcutting and planting, clearcutting with seed trees, group selection, strips, shelterwood, and in a few cases, pure single tree selection), are as indispensable and fundamental to forest management here as elsewhere. Actually, in all of our efforts, from the initial "seed tree" cutting on the Chippewa pine forests in 1902, we have been compelled to follow one or more, or a combination of these standard systems. Yet in certain outstanding cases, the wrong system has been advocated, one not adapted to the basic ecology of the desired species, such as the single tree selection system for longleaf and for loblolly pine in the South.

When a system goes wrong, it is because, under that system, reproduction of the desired species is not secured. Instead, undesirable kinds take over and establish themselves to the ultimate ruin of profits and sustained yield of the species sought. When our efforts have failed, it has been through lack of understanding of the basic requirements of seedlings in their struggle for establishment and survival. Of what use is the practice of seed trees or selection cutting if the final result is a mass of worthless brush or inferior trees in place of valuable conifers or hardwoods? I am not discussing the devastation caused by ruthless exploitation of the forest, which still continues in decreasing amount in New England, the Lake States, and elsewhere. I refer to the failure of professional foresters to grasp soon enough the significant facts that nature has constantly demonstrated, for those who would use their eyes and intelligence, as to her balanced methods of insuring the perpetuation of all species, good and poor; and inability to adjust preconceived notions and popular slogans, such as selective cutting, to the stark necessities of the situation. Outstanding in this category was the shibboleth "abolish all fires in the woods, everywhere!" This practice has cost the South, in the longleaf pine region alone, a sum almost beyond computation. It took forty years and millions of devastated acres before the indispensable role of fire in the establishment of longleaf pine was recognized by the profession and applied in practice.

Equally damaging has been the lack of understanding of the place of fire in securing reproduction of loblolly pine in place of inferior hardwoods. The attitude of the great majority of foresters, with widespread hardwood invasion confronting them on every hand, has been that nothing could be done about it effectively, and that the use of fire was anathema. Only now, after several decades during which hardwoods have captured more than half of the former pine areas, is the possibility of reversing this trend and bringing back fully stocked natural stands of pine receiving some of the attention it should have had from the beginning. Finally, in 1949 the U. S. Forester on page 5 in his annual report announces the advocacy of burning or scarification to secure reproduction of shortleaf, loblolly, and pitch pines.

Thus, the second cause of failure in applying sound silvicultural systems in American forest management has lain, not in the planning of the cut (seed trees, group selection, or what not), but in neglecting the fundamental requirements of the seedbed and establishment of the seedlings. It is just here that European practice excels. Otherwise all their "regulation for sustained yield" and their refined and efficient organization for production would have gone by the board. We have a great deal to learn from them about the reproduction of hardwoods, about which, at least in the southern bottomlands, we confess ignorance.

It is about time we quit smearing European "theoretical" forestry instruction, and recognize the fact that what they have learned about reproducing and growing

crops of timber is not so impractical as it appeared to be.

H. H. CHAPMAN.

Mulching Seedbeds with Cellophane[1]

Nursery practice generally demands that seedbeds be covered with a mulch in order to hold moisture in the germinating medium. This is particularly true with the conifers and with red cedar where seed is often sown on the surface. Burlap, pine straw, and prairie hay are some materials commonly used for mulching. The advantages and disadvantages of these various materials are generally known.

In 1949, transparent moisture proof cellophane was used as a bed mulch in the Oklahoma State Nursery on a trial basis. These trials gave such favorable results that further and more extended use of this material is being made in 1950. The advantages of cellophane mulching were so pronounced on these initial trials that other nurserymen may like to try similar methods. Our general observations are passed on for what they are worth. We have accumulated no supporting data.

We used a heavy grade moisture-proof cellophane (15,300 square inches per pound). This cellophane was provided in rolls weighing approximately 140 pounds. Each roll contained one continuous sheet of cellophane 48 inches wide and about 1,275 yards long. Cost was approximately 7 cents per lineal yard.

We tried 4 methods of application: (1) cellophane above burlap; (2) cellophane under burlap; (3) cellophane alone; (4) cellophane under 1-inch mesh poultry wire. Each trial was on 100 feet of seedbed, 4 feet wide.

We quickly learned that cellophane was not durable enough to mulch a seedbed without supplemental covering material to hold it in place. The exposed cellophane shrank and tore within a week's time, and unless burlap, wire netting, or other material was used to hold it in place, its effectiveness was lost.

The action of cellophane and a large pane of glass are very similar. Within a short time after the cellophane was laid on the ground, moisture collected under it, forming droplets of water just like moisture collects under a pane of glass on a flower pot. Consequently, the seed and the germinating medium were kept uniformly moist.

Daily watering was not necessary as with beds covered with burlap only. In fact, direct watering was not possible without first removing the cellophane. In our case, watering was not necessary at all as there was adequate moisture from capillary action. The seed remained undisturbed from the time it was sown until the bed covering was removed. The cellophane was removed when germination had progressed to a stage comparable to that allowed under burlap cover.

We found that fall-sown cedar beds covered with cellophane germinated as much as 3 weeks earlier than beds covered with burlap only. Germination was more uniform and complete. Initial growth was more vigorous and this early advantage persisted throughout the growing season.

At digging time we found that there were more seedlings in the cellophane-mulched beds and that they were 1 to 2 inches taller than those in beds mulched with burlap only.

Cellophane mulching was also tried with spring sown ponderosa pine. Germination was 5 days earlier under the cellophane than under burlap alone. The bed did not require watering from the time the seed was sown until the bed covering was removed. Density of the seedlings was greater and distribution was more uniform. The seedlings averaged 2 inches taller at digging time. They were fully developed and matured with longer secondary needles.

Burlap, when used as supplemental covering over a sheet of cellophane, remained in better condition, indicating a longer life. The burlap was not placed in contact with the soil and remained dry, or dried readily after a rain. The period of use was shortened by several days, and when the beds were uncovered the burlap was rolled up in permanent rolls for storage.

The use of materials more economical than burlap is entirely feasible. Since the purpose of this covering is merely to hold the cellopane in place it is likely that lighter materials, similar to that used in grocery stores for onion sacks and grapefruit bags, may be satisfactory.

This year (1950) we have 1,500 yards of fall-sown cedar beds under cellophane mulching. We used about a 3-inch layer of cotton burrs from a nearby gin for supplemental covering to hold the cellophane in place. This material happened to be readily available and so far has served its purpose very well. When the beds are uncovered we propose to leave these burrs in the aisles between the beds, gradually working them into the soil as an organic supplement.

ALBERT ENGSTROM,
Assistant Forester,
Oklahoma Planning and Resources Board,
Div. of Forestry.

[1]Paper presented at a meeting of the Ozark Section Society of American Foresters, February 3-4, 1950.

We Present

Erle Kauffman

In forestry, sometimes, the pen may be mightier than the increment borer. At any rate, the written word has had a big part in bringing about more forestry practice on the ground. And Erle Kauffman is one of those who, with typewriter or editorial pencil as their main implements, have made some important contributions to the advancement of forestry.

Erle Kauffman is now editor of *American Forests*, the monthly magazine published by the American Forestry Association. His intense interest in forestry and his desire to help advance the cause of forest conservation have been reflected in every issue of that magazine for the past 23 years, since he first joined its staff in 1927.

Erle came to forestry by an extremely circuitous route. He had certainly been around. Starting out on his own at the age of 17 he worked with a Geological Survey party in South Carolina, worked with the Union Pacific Railroad on a mapping job, served as a guard on the Angeles National Forest, was one of the first airmail pilots in the West, helped make movies in Hollywood, worked on half a dozen or more newspapers, and attended nearly half a dozen colleges. And that wasn't all by any means.

I am unable to tell about these varied experiences in their chronological order. Nor am I certain that there were not other and even more exciting episodes that I never heard about. Erle talks easily and interestingly, but not often about himself—least of all about his past exploits. His biographical statement on file at Society of American Foresters headquarters just about skips his first 27 years.

Anyway, here is the story of Erle Kauffman as best I can piece it together—now published, undoubtedly, for the first time.

Erle started out with the century; he was born in 1900 at Warrenton, Va. He lost his father before he was two years old, and went to live with his grandfather at "Orleans," the old family home. Erle and his granddad must have been great buddies; the old gentleman took him around to visit Civil War battlefields in the vicinity,

ERLE KAUFFMAN

and told him many a story of the old days.

Erle attended local public schools and Bethel Military Academy in Virginia; and Business and Central High Schools and Dowd Preparatory School in Washington, D. C. During 1917-18 he took courses in civil engineering and journalism at the University of Southern California. Somewhere along the line he also got in some special non-curriculum work at Randolph Macon College (English and History) and at Columbia (Journalism and Philisophy.) He also studied—and taught—journalism at George Washington University. During and between school sessions he worked with the telephone company in Washington; took the surveying job in South Carolina already mentioned; worked as a reporter on the *Baltimore American* and on the *Los Angeles Examiner;* and probably had a few other jobs that are not of historical record.

His first contact with forestry work was as a field assistant with the U. S. Forest Service in the California Region. He was with the Forest Service for two years, 1919 to 1921, part of the time in the field and part of the time as a draftsman in the San Francisco regional office.

Then Erle really got going. During the next several years he was a reporter on the *Baltimore Sun;* secretary and publicity manager for National Community Enterprises in Washington, D. C.; church and school editor for the *Baltimore American;* city editor of the *Sarasota (Fla.) Times;* special correspondent for NEA Service, Cleveland, Ohio; special writer for New York and Chicago papers. He was an assistant director on the old Metro movie lot in Hollywood for a spell. That was in the days when Bebe Daniels, Viola Dana, Mary Miles Minter, Douglas Fairbanks, and Ben Turpin were among the cinema favorites, and he helped direct pictures for these stars of the early twenties.

While he was in California, Erle also picked up flying some way or other, and had a job flying one of the pioneer western airmail routes, from San Francisco to Monterey. Then he took on the route over the mountains to Reno, Nevada—which doesn't look to me like a very easy route even today and must have been plenty tough back in the days when airmail pilots flew the old De Havilands, popularly known as "Flying Coffins." Erle had one serious smashup, but came out whole.

Erle continued to hold a transport pilot's license for a good many years; the last time it was renewed was in 1939. When World War II started, he tried to interest the Army Air Force in giving him a job, but the military seemed to think Erle was as old as the record showed.

All this, I submit, adds up to quite an unusual background of experience and preliminary training

for a career in the field of forestry.

In 1926, the U. S. Forest Service caught up with Erle again and put him in the Washington, D. C. office to handle press information. Erle was now back in the forestry fold, and there he stayed. In 1927 he joined the staff of the American Forestry Association as an assistant editor of *American Forests*.

The magazine has been Erle's Number 1 job ever since. The job of assistant editor meant everything from reading manuscript and making up page format to messengering the copy to the printer. Erle and Miss Lilian Cromelin, the other assistant editor, often wrote a good share of the whole contents of an issue themselves.

Erle was made associate editor of *American Forests* in 1936, and in 1944 he was advanced to the position of editor. *American Forests* has continued to go ahead under his editorship, in appearance, readibility, and scope. Its subscription list has grown. Working always with a very slender budget, he has succeeded in wangling articles from some of the big-money writers for a mere token payment. He has sought and obtained articles from many a forester, and with deft touches has made readable pieces out of contributions from those foresters whose major talents lay in other fields than writing. And some of the best articles the magazine has carried were written by Erle Kauffman himself. His stores on the Mt. Vernon Highway and on the Santee-Cooper River project in South Carolina were examples of outstanding reporting jobs.

Along with meeting the magazine's monthly deadline, Erle managed to do a lot of other things. He handled the Association's publicity. He worked hard on its membership campaigns. He helped arrange and conduct its annual meetings, and its special events programs, such as the American Forestry Congress held under the auspices of the Association in 1946.

He made a motion picture, *Penn's Woods*, for the Pennsylvania State Forestry Association. *Burnin' Bill* was another movie he made, for use in the special educational project for forest fire prevention sponsored by the American Forestry Association in the southern states during the thirties. He wrote articles for other magazines, including such highly popular ones as the *Saturday Evening Post* and the Journal of Forestry. He wrote two books: *Trees of Washington, the Man and the City*, published during the bicentennial observance of George Washington's birth (1932); and *Kingdom of the Trees*, a children's book on forest conservation (1940).

Erle was the "daddy" of the Trail Riders of the Wilderness. He thought up the idea, developed the plans, publicized the project, made the innumerable necessary arrangements almost single-handed. The first Trail Rider expeditions to wilderness areas in the national forests were conducted in 1933, under American Forestry Association auspices. Except for some of the war years when transportations difficulties made the trips impracticable, Trail Rider expeditions have been conducted every year since. Conducting a bunch of city "tenderfeet" of all ages and both sexes on a two-weeks horseback trip through wilderness country is no small undertaking. That the trips have been conducted year after year without serious mishap, that many riders have signed up for repeat trips, that those who have made the trips have become an enthusiastic "alumni" group of boosters—all these things are evidence of Erle's careful planning and competent direction.

Erle Kauffman makes no claim to being a forester in the technical sense. Modest and soft-spoken, he would be unlikely to claim special distinction in any field. But forestry is certainly Erle's career. It has been his big interest for the past 23 years. He has worked hard and effectively for its advancement. He has written a good many thousands of words in its behalf. And many of those words have had influence in promoting the practice of forestry and the prestige of the forestry profession.

As a reporter, Erle has always been fair and unbiased, as an objective reporter should be. But editorially he is not hesitant about speaking up for what he thinks is right. And when it comes to conservation of natural resources he is a real crusader.

In 1931, Erle Kauffman married Paula Graff of Washington, D. C., a well-known concert pianist, with a successful background of a decade with the legitimate theater of New York. They have a son, Galen, 17, (who wants to be a forester) and a daughter, Mary Anne, 7. Erle and his children are good pals. He likes to go fishing with his son, although he says Galen catches the most and the biggest. Erle plays the piano quite well, and he can pick up almost any other instrument and make music come out of it. I gather that his family likes to have him around. Other people do, too. I never knew anyone who didn't like Erle Kauffman.

Charles E. Randall.

Points of View

Comments on Lyle Watts' Statement in March Issue

I was not one of the 167 voting members who signed a petition for a referendum on the question of federal regulation. Had I been one of the signers of the original petition, I probably would not have been one of the 68 members who rejected the suggestion of the Council for a modified form of referendum. However, I find nothing ambiguous, covert, insidious, or obscure in the language of the original proposition, viz:

> Shall the Society of American Foresters through its Council favor or oppose the principle of federal regulation of private forests, and federal legislation looking to the establishment of the principle.

The statement in the first paragraph of Mr. Watts' discussion as to the types of regulation favored by different individuals is succinct and accurate, but the assertion in the first sentence that the proponents of the referendum "have posed a question which is not clear cut," seems to me inaccurate and misleading. I am astonished that Mr. Watts can find in the proposition, as quoted above, any lack of clarity and definiteness. I find no evidence in the report in the February JOURNAL (p. 143) that the Council discovered any ambiguity in the proposed referendum. The alternative propositions which the Council suggested were directed to the ascertainment of the views of the members of the Society on seven distinct and separate questions which were much more specific than the original proposition, but certainly no more definite.

In his third paragraph Mr. Watts suggests a form of referendum "to sharpen the issue." But, if to the word "regulation" is assigned the ordinary meaning that the word has when used by foresters with respect to governmental control over the management of privately owned lands, the suggested phraseology would only befuddle and confuse the issue. If Mr. Watts is correct in his assumption that the Society has already decided, irrevocably, that "regulation is necessary," then the question whether this regulation shall be exercised by the federal government is a logical one. If regulatory legislation is enacted by the national government, it will necessarily, inevitably, take precedence over any state legislation heretofore or hereafter enacted. Surely, there is no occasion for a vote by the Society on the question of whether the federal government should take any part in the encouragement of good forest practices. Every one recognizes this obligation and the legal power of the government to meet the responsibility. But, if "regulation" is to accomplish the purpose that its advocates have in mind, it must be *regulation*—not beneficent participation, not moral suasion, not financial assistance, but *regulation!*

For myself, I would say that I would not choose even federal "participation" which was directed to the enforcement of the type of state regulation that has been advocated by some. Members of the Society who have indicated that they favor stringent state regulation might not favor the vesting in federal officials of the authority to compel a state to maintain the standard of regulation that such officials might consider essential. The formidable character of the "federal participation" advocated by Mr. Watts is disclosed by his statement that "the federal government would undertake regulation in any state which did not adopt and put into effect a satisfactory plan of its own within a reasonable period." This is not the kindly hand of encouragement or the helpful lift of participation; it is the firm grasp of authority. It is clear that the federal "participation" which Mr. Watts visualizes is intended to be paramount and controlling.

Mr. Watts despairs of solving our forest problems through cooperation, education, and technical assistance. He not only believes that compulsion is necessary but maintains that effective forest practices can be achieved only through the exercise of mandatory or minatory action by the federal government. Conceding the accuracy of many of his statements regarding the failure of landowners to manage their forest efficiently, I still doubt the efficacy of coercive measures to establish sound forest practices. I readily concede a national interest in our forest economy and believe that the expenditure of national funds in the encouragement of appropriate forest practices is justifiable and advisable, but I believe the interests of the people of the various states would be better served by the expenditure within the states, under state authority, of funds derived from taxation within those states rather than by a system of federal distribution of the portion of the same taxes that may remain after federal tax collection and administration expenses have been deducted therefrom.

I am not impressed by the citation of tendencies toward federalization of authority in our national history. I believe much of this centralization has been unnecessary, unprofitable, and retrogressive. I am not converted by the statement: "Experience thus provides small basis for the hope that state regulation without federal participation ever will be generally effective." To me, the lull in coercive legislation since 1945 indicates a swing back to sound thinking and I believe that during the period 1945 to 1950 greater progress has been made in forestry in the United States than during any other five years in our national life.

The artful reiteration in the final paragraph of the suggestion

in the third paragraph that those who favor state regulation should vote for federal regulation, since this would not be voting against state regulation, should be carefully scrutinized. Such a vote should be clearly recognized as a vote *for* federal regulation. The fact that such a vote is not against state regulation is not pertinent to the issue presented in this referendum.

J. P. Kinney.

Referendum on Federal Regulation

The referendum on federal regulation of private forestry upon which our members are soon to vote is not such a clear-cut issue as might appear at first glance. The principle of federal regulation of private forests is, to some extent, inherent in much of our present day forest legislation. As Speary stated in the February Journal, regulation creeps in in the Production and Marketing Administration programs to aid farm forestry, including the turpentine farmers in the South, in the Pittman-Robertson Act which makes planting stock available for game food and cover, and in the Clarke-McNary law which provides fire control for private lands. I feel confident that few of the petitioners would wish to see these federal activities abolished.

The strength of our country rests largely on the fact that through democratic processes the will of the people can call upon all levels of government to pursue objectives deemed beneficial to the public welfare. This strength has enabled us to survive foreign and civil war, economic booms and depressions, spy scares and periods of extreme individual freedom. The people have confidently called upon the economic strength of their governments to promote the building of highways, railways, and canals and to aid shipping, the public newspapers, and war industries. Government aids to business include tariffs, a stabilized banking system, and the Reconstruction Finance Corporation. Aids to farmers include education, research, soil conservation, and price stabilization.

With these aids goes some degree of federal regulation. That federal aids have stimulated the development of our country is tribute to skillful working out of democratic processes by public administrators and private beneficiaries.

The petitioners demand that we vote either to favor or oppose federal regulation. No middle ground is allowed. Yet, compromise is the very essence of democratic action. To close the door to compromise on issues which vitally affect the economic strength of the nation is to close the door on democracy. To place the Society of American Foresters in a position where it must oppose public measures to improve American forestry without offering constructive alternatives is to incur public ill will and to negate the principles of our own Society. We must not commit our Society to fighting rear guard actions against those seeking to promote better forestry by federal action.

In appealing to the membership on this vital issue it is only fair that the appealer set forth clearly his own viewpoint. I believe in private forestry—enough to own forest land. I believe government should promote private forestry through research, education, essental public aids, and regulation of practices. I believe that ultimate authority in regulation should rest with local boards representing the various interests concerned. But, these boards need help from state and federal authority to establish standards in keeping with national needs.

A vote to oppose federal control of private forests is a vote to paralyze federal action to promote private forestry. A vote to favor the principle of federal regulation keeps the door open for federal actions which may be just as popular as measures now universally accepted.

Hardy L. Shirley.

Federal Regulation

The writer has been a member of the Society of American Foresters since the day of its organization. He looks back over more than five decades of forestry development. Each decade has shown increasing progress. Today great programs are underway by federal government, state and private interests. All are rapidly expanding. The goal has not been reached but our country is well on its way towards satisfactory development in forestry.

Forests are responding. Today trees are being harvested in many parts of the country which were small seedlings or saplings when the Society of American Foresters was organized, and this as a part of a program of sensible procedure in forest practice.

A coercive program by federal government is not needed. In fact, more progress will be made without it.

The impending referendum will likely show a divided Society. Should it show a majority for federal regulation there is small chance it could be brought about.

It is a coercive plan aimed at a large segment of individual and corporative land owners. Pressed in Congress it would collide head-on with a policy already established and strongly supported, not only in Congress, but by well-organized groups throughout the country. That is the Soil Conservation Program with its 2,200 organized districts and with extensive forestry activities in progress. This is distinctly a cooperative program, representing federal, state and private activities.

How far could a coercive program cut into this great cooperative movement? In this member's opinion, not very far.

The cooperative soil conservation movement includes forestry as fully as it does farm practices. It uses many foresters. It has strong support in Congress. Members of Congress are in close touch with this program and its leaders. These leaders and local land owners are substantial people. They hold many meetings and to a large ex-

tent thresh out their own problems.

It is but natural that members of Congress should highly respect the thinking and the programs of such influential elements of their constituencies. These groups will stand for the principle of cooperation as against federal coercion in the management of forest lands whenever the issue arises. Is it not likely that members of Congress will take the same stand?

It is the opinion of this member that it would be unwise for the Society of American Foresters to support a flanking movement against the cooperative program represented by the National Association of Soil Conservation Districts. Would not the better course be to give that movement our endorsement and full support?

The writer will vote against the principle of federal regulation of private forests.

WILLIAM L. HALL,
Fellow

Regulation Snafu

The present regulation referendum seems a backward step in our slow and painful progress toward achieving forests in balance with needs.

The 1940 statement is statesmanlike, forward-looking and of a sort a society which claims to be representative of all shades of interests can formulate on a deeply controversial issue. It emphasizes objectives, principles, and a general formula. Undoubtedly, it can be further refined and pointed to meet current situations and needs. But the present approach is not the way. It's back to talking about regulation in capital letters and attempting to precipitate a simple yes-no issue to which the complex issue of public controls is not susceptible. Regulation means too many different things to too many people.

What are we trying to vote on now? The 1940 statement endorsed the principle of *public* regulation. The present referendum narrows the issue down to the principle of *federal* regulation. The addition of the words ". . . . and federal legislation looking to establishment of this principle" really says no more though it sounds like it does. Acceptance of the principle would certainly imply the possibility of legislation to back it up.

Endorsement of the principle of federal regulation does not necessarily go beyond recognizing it as a possibility. Looking at it this way, why should one deny the possibility of federal regulation concerning a natural resource of such vast and widespread national interest? I certainly don't deny it as a possibility; to do so would be a virtual denial of government. We have federal controls in many other areas of our national life of no greater public importance. We have it in forestry now in some measure through the Clarke-McNary law, for example. Whether or not federal control of cutting practices (which is what I believe we are talking about here though not so stated in the referendum) needs to be applied now, and if so, how and by whom, is something else and is not under discussion here as I see it. The vote is not on whether the Society favors or opposes federal regulation at this time. That is a question for a free people to decide with the facts and a specific proposal before them.

It is unfortunate that the petition links the highly controversial Anderson bill with this referendum. To me, they are not connected and should not be. Affirmation of the principle of federal regulation cannot be fairly construed as endorsement of the bill or any other specific proposed legislation. But confusion over this, added to the difficulty of knowing just what the vote is on, makes it seem likely that the result of the vote, whether heavy or light, negative or affirmative, will not be really indicative of individual or professional thinking on the subject. I'm going to vote for the referendum because there seems little alternative, but the issue is not so presented as to bring out a significant expression of Society opinion.

KENNETH P. DAVIS,
Professor of Forest Management,
University of Michigan.

Conclusions & Comments—50 Years Apart

Guttenberg in his scholarly, well-reasoned, and carefully referenced article[1] points out one of the fallacies in the arguments of those who advocate more and more "free" aid and services for the owners of "small" areas of forest land under the various state and federal programs; fallacies which some of the advocates of these programs have consistently disregarded and ignored in their unremitting efforts to build and expand this program.

As a basis for his discussion of the element of "time-preference" in establishing the interest rate Guttenberg quotes Fetter who says, "Powerful and universal impluses work in favor of present gratification; man's provision for the future occurs only when imagination, reason, habit due to long training, and a strong will to pursue a distant object hold these impulses in check." Guttenberg applies this quotation and his summation of other authorities on economics, such authorities as Cassell, Ely, and Wehrwein, to the time-preference problem as it applies to interest rates and forest management. He then reaches the following conclusion: "It follows that time-preference varies from person to person and year to year, depending principally upon the degree to which current personal income and assets satisfy current personal wants. The small landowner whose income has never equalled his basic current wants would have little or no resistance to selling stumpage now rather than later. Therefore, he is willing not only to accept a low stumpage price but also to destroy his growing stock in order to get his fractional part of its

[1] Guttenberg, Sam. The rate of interest in forest management. Jour. Forestry 48:3-7, 1950.

worth. Educational programs in forestry aimed at such owners can have but very slight hopes of success." And from his summary:—"Where the small owner has a high time-preference rate, it may be impossible to interest him in good forest management as a business venture."

B. E. Fernow in his *Economics of Forestry* was critical of the "free aid" policy. He showed that the system has failed in the past and at the same time foresaw continued pressure for the expansion of its use. He pointed out its dangers in a discussion of the problem that has proved to be astonishingly accurate. "In addition to these educational methods which incite private activities in the right direction by indirect means, namely, by increase of knowledge, there are more direct ameliorative or promotive methods to be found in bounties, which are given to aid private endeavor in pursuit of private industry.

"These may take form of assisting by . . . making working plant or otherwise specifically assisting in private forest management beyond the giving of general information, and finally by tax release and tariff duties.

"We are approaching in these methods closely to paternalism, when the state is doing for the individual what the individual could or should do for himself, when the state is doing more than providing opportunity for individual activity; at least the danger of transcending proper policy and abusing public interest is always present with these methods.

"It is, therefore, necessary to scrutinize much more carefully the conditions under which proper policy is subserved by them. Curiously enough, these paternal methods have found much more favor and are more extensively used in our country than the European countries, which are usually charged with the opprobrium of paternalism; and in spite of the fact that the results have been rather disappointing, the advocates of these methods continue successfully to impress their opinions upon legislatures."

Thus two authors writing almost a half-century apart have emphasized the fundamental weaknesses of the program which has been and is being pushed by the advocates of free and unlimited aid and service to *all* forest landowners. Both Fernow and Guttenberg agree that the method advocated is foredoomed to failure. Guttenberg says they are doomed because of uncontrollable individual economic factors. He also shows that the statistics on which the appeals for ever increasing funds are based fundamentally incorrect and misleading. Fernow demonstrated that the system of free aid was tried and failed prior to 1902. Others gave evidence that it has failed ever since, a fact established by its advocates who always recommend that it be expanded because existing and previous appropriations and programs were "inadequate." Thus the fundamental weakness of the system is recognized, explained, and ignored.

Lest any person imagine that the solution is the passage of the Anderson Bill (S. 1820) or some similar legislation it is important to note, as pointed out by H. H. Chapman[2] that the proposed law "gives the Secretary [of Agriculture] blanket authority to designate by proclamation, any forest land that shall *not* be subject to his rules and regulations . . . ." "Political considerations, as affecting the farmer and small landowner, are not specifically mentioned as a reason for non-enforcement." But anyone who reads the daily papers and has thus kept himself informed of the successful use of political pressure to continue and expand the unsuccessful program of subsidies as a means of solving the problem of our agricultural surpluses knows that these same pressure tactics can and will be used to make certain that the owners of small acreages of timber will be exempt from any regulation of their forestry practices.

One can hardly believe that those foresters who advocate ever-increasing programs for the expansion of "free aid" and use all-inclusive statistics for their purposes are aware of what they are doing. Could it be that they are misleading themselves, the public, and the national and state legislatures? Certainly a re-examination of the premises on which the appeals for more and more aid are based and the statistics used to support these demands is a basic requirement from the standpoint of both the professional judgement and the reliability of the forestry profession.

Robert Moore,
Danville, Pa.

[2] Chapman, H. H. A showdown on federal regulation. Jour. Forestry 47:746-748. 1949.

Author's Comment

I sincerely appreciate the interest that Moore has shown in my article. I should like to point out, however, that my paper deals with the technical aspects of interest theory, not with forest policy. The inferences that Moore has drawn from my article are his own.

From the same point of departure in time-preference theory, Moore might have reasoned quite differently with at least equal logic: recognizing the time-preference barrier, purely educational programs can be directed more pointedly to the audience that will use them, and the need is underscored for supplementing such programs with forest credit and technical assistance; furthermore, for high-interest-rate owners not otherwise approachable, public regulation offers the one avenue to better management.

Sam Guttenberg,
Southern Forest Experiment Station.

On the State of the Society

The main unsettled issue confronting the Society at present is no new one. It involves the attitude of the past Council towards the position that foresters, through their professional organization, should take towards public legisla-

tion and administration involving fundamental policies that have decisive influence on both public welfare in the field of conservation and professional interests and standards.

The declared and enforced attitude of the retiring Council, which was reinforced by a referendum in 1942, was that while the Society should express itself on general policies, all efforts to influence the implementation of, or to oppose laws affecting these policies should be banned. The wording adopted in the referendum of 1942, which concerned the general subject of regulation of private owners was: "This statement of the Council's position must not be interpreted as endorsement now or later of any bill which may be introduced. We urge the members of the Society to scrutinize carefully and be prepared to criticize constructively all legislation proposed in order that our profession may contribute to the fullest its knowledge and experience."

While the above statement, through its context, referred especially to federal bills on the subject of regulation of private owners, the principle of nonparticipation by the Society through the Council in any efforts whatever to influence legislation, regardless of the subject or of the adopted policies of the Society, has been clearly reiterated by ex-President Clyde Martin in connection with the forthcoming referendum on federal regulation of private forest property. His decision not to oppose the Anderson bill, S. 1820, expressed in a letter to me early in the summer, led to the decision to submit the petition for the referendum, not on this or any specific bill, but on the single issue of federal regulation of private forests.

This petition, after a proposal by the Council for its modification and extension had been rejected by ballot of the petitioners, was accepted and referendum ordered to be balloted on in April as the earliest date conforming with the requirements of the by-laws. Announcement of the referendum appeared in the February 1950 JOURNAL.

In the rejected substitute the past Council stated "The Council is opposed to referenda referring to specific legislative proposals. They often include different items which cannot be dealt with by a single overall vote. Furthermore, bills are so frequently amended, from stage to stage, that a referendum may quickly become out of date, and be no longer applicable to amended bills or similar bills introduced later." President Martin and the Council ruled that in the publicity on the referendum no discussion of specific bills, such as S.1820 should be permitted.

The question before the Society, as I see it, is now what happens if and when the referendum is adopted establishing the policy of opposition to federal regulation of private owners? If the newly elected Council follows the precedents announced, nothing will happen. No opposition will be expressed to a reintroduced S. 1820 nor to any other bill seeking federal regulation.

Meanwhile, after the successive Councils under President Schmitz and Allen had split evenly on the question of opposing the Oregon and California Land Grant grab and the third Council under President Martin had refused to take any action, the petition for referendum on this specific bill was presented, and after nearly a year's delay, was adopted by a vote of over 3 to 1, indicating that in this case the members wanted action on a definite bill.

In handling this case the Council became involved in a counter petition opposing the original petition on the grounds that it did not constitute a subject that the membership of the Society should act upon. The members were forced to decide this issue, which they did affirmatively. Does this sort of question have to be fought out separately for every proposal for action on specific legislation? If the present Council follows the position taken by its predecessor, we have arrived nowhere. Had the opponents of this petition been willing to vote against the petition on the O. and C. bill, on the basis that it was not a proper measure for consideration, no counter petition need have been presented. My personal feeling is that the adoption of the petition opposing the O. and C. legislation put the Society overwhelmingly on record as being in favor of action by the Council on specific bills. The past Council's position is diametrically opposite, and if held, we can expect no action program as the result of the ballot on referendum on federal regulation.

So important did the Council of 1935 regard action programs that Bylaw 21 was adopted, (see JOURNAL, January 1950, page 56, 3rd column), which was intended to prevent injunctions on the Council by petitions preventing it from acting promptly on dangerous legislation when in its judgment delay would cause the Society and the profession to suffer damage.

But as the result of the O. and C. embroglio, when the Council permitted a counter petition to tie up action for an entire year, the Council instead of *ruling out counter petitions*, repealed the bylaw itself, sanctioned the practice of counter petitions by incorporating mention in the new bylaw, and abrogated to itself the authority, in such cases, to do as it deemed best for the "orderly and effective management of Society affairs." Orderly management could have been secured by ruling out counter petitions.

Then, in further weakening the right of petition, the Council proposed, and the members adopted a constitutional change providing that a petition must have 250 signatures of which 25 must come from each of three different Sections. Yet except for the two recent petitions, on the O. and C. case, and on federal regulation, each of which had been debated for 5 and 20 years respectively, the right of petition against the Council has not previously been used since my term as President in 1934-1937, when the question came up as to whether the Council had the right to dismiss its employees. There has been no abuse of this right, and I honestly feel that the repeal of Bylaw 21, and substitu-

tion of the present bylaw merely strengthens the attitude of the past Council on the main point at issue, namely, do the members of the Society want an action program, based on adopted and approved policies, or do they wish to dispense with this function of a professional society?

This statement is not an attempt to force the hand of the newly elected Council. But it must be obvious that unless the established Council policy of non-action, unless forced in each specific case, is followed by the present Council, we are surrendering our effectiveness as an influence for sound policies and legislation. In such a case I would favor putting the whole issue up to the members, despite the estimated cost of referendums, of $500, to determine whether they want action or merely words, as adequate Society policy.

H. H. Chapman.

Reviews

Forest Utilization in the Transitional Stage.

By George A. Garratt. 28 pp. Duke University School of Forestry Lectures No. 8. Durham, N. C. 1949.

This booklet constitutes a most valuable 30-minute refresher course for any practicing forester. It does for a Journal of Forestry and trade magazine reader what a weekly news magazine does for a newspaper scanner.

The significant developments and opportunities in better wood utilization are mentioned in a captivating and realistic manner. In addition, their bearing on better timber management is also pointed out.

"The problems of present-day forest utilization are fundamentally economic," says Dr. Garratt, and he goes on to say that "the prescription for improving our woodlands calls first for the development of market outlets capable of absorbing . . . the low-grade materials that need to be removed from our forested areas." Cooperative action is being taken in developing and extending market outlets, he says, that results in mutual economic benefit to timber producers and those who process and market forest products.

The "transitional stage" referred to in the title is the present period when forest utilization is becoming largely dependent on second-growth rather than virgin timber supplies.

This booklet is important to Society members for three reasons: 1. Current information is provided on wood utilization developments. 2. The inter-relation of timber growing, harvesting, and manufacturing is clearly shown. 3. Ways in which timber management problems can be solved through the application of utilization developments, economic principles, and cooperation are indicated.

Robert D. Hostetter.

Forty Years of Western Forestry.

By Eloise Hamilton. Foreword by Clyde S. Martin. 64 pp. Illus. Western Forestry and Conservation Association, Portland, Ore.

In 1908 Billy Entwistle began hiking mountain trails between logging camps in the Douglas-fir, as the first fire warden in the Northwest. In those days, when he saw a train of smoking logs on the way to the booming grounds, Warden Entwistle thought nothing of it. He was indeed a lone voice crying in the wilderness as he toiled over the pinnacles, bearing the gospel of the new Washington Forest Fire Association from camp to camp. A year later two or more western organizations of foresters and timber managers came into being. One was the Pacific Logging Congress, the other was the group that is now the vital and influential Western Forestry and Conservation Association. Both were hell-bent against fire.

Forty Years of Western Forestry is a historical sketch of the association. The work of an experienced and talented Oregon writer, Eloise Hamilton, the pages of the story are made to march in unflagging order and force from the first sentence, "Find out the right thing to do, go ahead and do it," to the last paragraph, which lifts hope's banner in these terms:

"By bringing together the combined knowledge and interest of all, this organization finds its greatest usefulness. It has helped lay the foundation for sound forest policies and good forest management in the West through cooperative action. On this basis, the Association will push forward 'aiming to secure the forest future of the western region by bringing private, state, and governmental forces together for cooperative forestry effort.' "

It was George S. Long, late great manager of the Weyerhaeuser Timber Company, who gave the "go and do" order in 1909, when the work of the Western Forestry and Conservation Association began. Edward Tyson Allen, the association's first executive for-

ester, had been district forester of the Sixth District of the U. S. Forest Service. Allen, also a newspaper man of experience, was the first potent public relations man of forestry. The ideas and methods he introduced are still standard practice in this swarming forestry field.

Allen is the hero of the story, because it was his real role. Other noted names are starred with his, however, in phases of the growth of forestry cooperation and public education in the West. W. B. Greeley, C. S. Chapman, Norman G. Jacobson, C. S. Cowan, C. S. Martin, George L. Drake, E. T. F. Wohlenberg, and present WFCA Forest Counsel Stuart Moir, all are cited in text or picture. The name of A. L. Flewelling stands with Long and Allen in the pages on the development of the organization.

Mrs. Hamilton's excellently organized and written sketch is in 8 chapters. The titles, "Birth of an Idea," "Organization," "E. T. Allen," "The Fight Against Fire," "High Points of Achievement," "The Clarke-McNary Law," "Expanding Influence," and "Looking Ahead," show how the story goes. It is an important outline of forestry history in the West, and mightly good reading.

JAMES STEVENS,
Seattle, Washington.

Forest Management Education in Oregon.

By Walter Fraser McCulloch. 135 pp. Oregon State College, College Press, Corvallis. 1949.

Basically Prof. McCulloch's thesis is that the curriculum in forestry schools needs to be modernized. U. S. forestry in the beginning was largely a custodial job whereas it is now complex. Foresters to succeed today must not only know advanced techniques but have some training and capacities to be administrators. More attention should be given to whether the student's aptitudes and interests aside from training, seem to fit him for a career in forestry.

Although the schools have in general kept up with the advanced techniques in forestry, so that the graduates in the main are technically competent, there have not been the basic changes, from the forestry course first taught at Cornell in 1898, needed to keep up with forestry's present place in a changing world.

Emphasis is placed upon the need for developing administrators and undoubtedly this is important, although not to the exclusion of research or other specialties. The forestry schools are stated to be graduating many technicians who either have no interest, or have had no opportunity—preoccupied with technical courses—to develop an interest in administration. To become a successful administrator, one should have an interest in administration, and training in administration, personnel management, speaking and writing the King's English, economics, and other "general" fields such that he can take his place in the "society of his fellow men."

Prof. McCulloch states that "a professional school has obligations transcending education *per se*. In a sincere effort to teach well it is possible to lose sight of the purpose of teaching." He recommends a forestry school personnel program—aptitude and interest testing, orientation, counselling, personal and professional guidance, employment service, and follow up.

As to changing curricula, McCulloch quotes two interesting opposites. Aydelott says that "All times of strain, such as war or depression, tend to shake men's faith in liberal education. When danger threatens, competence to perform immediate practical tasks is at a premium and the expert takes precedence over the philosopher." Hutchins however, feels that "All that can be learned in a university is the general principles, the fundamental propositions, the theory of any discipline. The practices of the profession change so rapidly that an attempt to inculcate them may merely succeed in teaching the student habits that will be a disservice to him when he graduates."

Again, broadening college training means either lengthening the course, or adding general courses at the expense of cutting down on technical courses. Other fields, such as engineering, medicine, etc., are confronted by the same educational problems. As Dana wrote, "It is the old problem of how to obtain breadth without superficiality, and depth without narrowness."

At Oregon State College it is proposed to accomplish these purposes at the School of Forestry by "(1) rigorously eliminating all deadwood, all duplication of courses, and all material retained for traditional reasons; (2) eliminating courses whose chief purpose is to simulate apprenticeship by training the men for immediate on-the-job proficiency; (3) consolidating courses similar in principle, varying only in detail; and (4) changing forestry instruction from subjective to objective emphasis."

"Public Forest Management Education" with its peculiar civil service requirements, etc., is discussed, followed by a discussion of "Industrial Forest Management Education," and recommendations for specific changes in curriculum. Details cannot be given here but the following table is of interest.

The reader may disagree with some of the analyses and recom-

Percentage of Required Course Hours
(Oregon State College)

Subject fields	Technical forestry 1940	Forest management 1947	Graves & Guise, proposed curriculum
General education	36	46	43
Pretechnical education	15	20	23
Technical education	49	34	34

mendations, regret the rather exclusive emphasis on "administration," and feel that the whole has too much of a local or regional slant.

The publication should make worthwhile reading, however, for those interested in forestry education and its products.

Perkins Coville,
U. S. Forest Service.

Grasses and Legumes for Soil Conservation in the Pacific Northwest.

By A. L. Hafenrichter, Lowell A. Mullen, and Robert L. Brown. 55 pp. Illus. U. S. Dept. Agric. Misc. Pub. 678. U. S. Govt. Printing Office, Washington, D. C. 1949. 20 cents.

This new bulletin is a welcome and timely addition to the literature on grasses and legumes for use on farms, ranches, and ranges of the West. To the rancher and land manager of the Pacific Northwest interested in grass, it will be an invaluable tool in deciding what species to plant and how to plant. The usefulness of this bulletin is not limited to the Northwest; much of the information it contains is widely applicable.

This well-illustrated bulletin is based on over 12 years of testing and observational work in Soil Conservation Service nurseries and on farms. Over 7,000 accessions of grasses and 500 accessions of legumes have been observed and tested in the nurseries. To facilitate testing of such a large number of accessions, the authors followed a quite original approach by dividing them into groups that reflected a common use or quality and comparing the species within groups. This bulletin describes the best adapted and most useful grasses and legumes divided into the following use-groups: rapid-developing, short-lived grasses; rapid-developing, long-lived grasses; late-maturing grasses; drought-tolerant, long-lived bunchgrasses; drought-tolerant, long-lived sod-grasses; vernal dominant, dry-land grasses; understory grasses with heavy root production; wet-meadowland grasses; sand-stilling grasses; and new legumes. For each of these groups, grasses of primary and secondary importance have been described.

For each grass the adaptability by zones and land capability classes is presented. A very helpful map is included for each of the primary grasses showing the zones of primary and secondary use. Notes are presented on the use, productivity, altitudinal and moisture limitations, seed production and seed harvest. Considerable emphasis is given to the description and discussion of differences in strains, climatic races or varieties and their adaptability. There are also valuable notes on rates and methods of planting.

A wealth of information, clearly and concisely written, is presented. The bulletin is the most complete that has appeared on this subject in this country and as such is almost certain to become a standard reference for range and pasture workers, ranchers, seed producers, and seed dealers.

Joseph F. Pechanec,
Pacific Northwest Forest and Range Experiment Sta.

The Western Range Livestock Industry.

By Marion Clawson. 386 pp. Illus. McGraw-Hill Book Company, New York. 1950. $5.

This is an extremely interesting book to those who have given any thought to the western range livestock industry and the part it has played, and continues to play, in our national economic and political life. Its wealth of information on livestock production and ranch operation would make it suitable for use as a textbook for an animal husbandry course. It would be equally valuable to a conservation course, because of its emphasis on orderly utilization of a great natural resource, on other uses of the range country, including water, recreation, forests, and wildlife, and on the problems of federal administration of the physical basis of a private industry. For the same reasons, it should be of interest to students of government and to observers of the American scene.

The author brings to his task a background of "over twenty years of professional work and of forty years of living in the range livestock region," as well as association with Harvard economist John D. Black.

The portions of this book dealing with federal administration of range lands will be of particular interest because of the recent controversy over control of these lands, which has not yet died out entirely. Clawson treats this in a manner impartial on the whole. Certainly the stockman's point of view is fully recognized. Unfortunately, the extent of depletion, as brought out in Senate Document 199, *The Western Range*, is minimized. An article by Frank and Netboy in *American Forests* for February 1950, calls this report too optimistic. However, Clawson does make a convincing case for federal control in the mountain region and explains clearly the need for multiple use management. He brings out the fact that relations between stockmen and federal agencies are generally good. His advice to develop all uses of range land in harmony is both sound and constructive. In the Great Plains portion of the range livestock region, federal ownership is not a factor. Here problems arise out of the mixed ownership pattern and the threat of lands being taken by the plow in periods of high prices and greater than average precipitation.

Another interesting subject is grazing fees. The conclusion that cheap use of federal lands does not represent a subsidy to the livestock industry, because its owned lands have been overcapitalized, may be tenable, but this is not the fault of the federal taxpayer. If cost of administration, rather than commercial value of the forage, is accepted as a reasonable basis for fixing grazing fees, then the question arises why the

Bureau of Land Management does not collect the full cost. An interesting comparison might have been drawn between timber, which is sold to the highest bidder, and forage use, which is awarded by administrative decision. Of course, the Sustained Yield Act is a step bringing the method of awarding timber closer to that of awarding forage. Undoubtedly, administrative award of grazing privileges serves the economy of the region better than would competitive bidding. To the economist, appraisal would seem to be sounder and fairer than a uniform fee for all ranges, regardless of condition, accessibility, etc.

But questions of federal control occupy only a minor portion of the book and may easily be overemphasized. A number of interesting economic factors are brought out, such as the small total number of ranches, the extent to which livestock products are consumed within the range region, the line of institutional demarcation along the 98th Meridian, and many factors of meat consumption and ranch operation. The historical disposition of the public lands is presented in clear perspective. A great deal of economic information is presented. For the most part, tendencies are cited, rather than suggestions. The book would therefore seem to be of limited value to a rancher, except to inform him of operations in localities other than his own. The chapter on credit is outstanding in that concrete conclusions are presented. It is unfortunate that census figures provide most of the available data, with all the deficiencies of average figures. Figures obtained through dividing the number of animals in a state by the number of establishments classed as ranches do not provide a very realistic or useful picture. Figures for calf and lamb crops appear low on this basis, but there does not seem to be any very clear suggestion that they should be improved. A book on the economics of ranching might well have included more information on the methods of marketing, as commission firms, auctions, and cooperatives.

The author previously devised a measure of the tendency for a number of wet or dry years to group together, known as the coefficient of variability sequence. Range managers have suggested that the range be stocked conservatively in line with capacity in the average year. The author suggests with considerable logic that if high prices came at the same time as several wet years, ranchers would be unwilling to hold down livestock numbers. Therefore a means of expanding and contracting operations is needed. The difficulty is there is no way of telling when a series of dry years is starting. If range condition is used as a criterion, severe damage might be done before sufficient contraction could take place.

The book is written in an easy, non-technical, almost conversational style. It is well documented, and the author has apparently made a very complete survey of the literature. An effort has been made to draw on the latest sources available, although reference to Forest Service regulations (p. 116) is dated 1936. The book is oriented to the economics of ranching. The author states this to be his intention and has adhered to it very well. He has brought a great deal of material together and presented a clear picture of the range livestock industry. Range managers and teachers will wish to draw upon the material in this book to supplement that in *Range Management* by Stoddart and Smith, also one of the American Forestry Series.

A. G. RANDALL,
University of Maine.

"The seriousness of this [fire] problem is obvious when it is realized that the pulp and paper industry provides about a $200,000,000 annual payroll to the economy of the South by using no more wood than is now wasted through fire and its disastrous after effects."

HENRY J. MALSBERGER,
General Manager,
Southern Pulpwood
Conservation Association.

Current Literature

Compiled by MARTHA MEELIG, *Librarian The New York State College of Forestry*

Range Management Section Compiled by FRANCIS FLICK, *Library, U. S. Department of Agriculture*

General

The Children's Book of Pulp and Paper. By Leonard Knott. Illus. Canadian Pulp & Paper Assoc., 2280 Sun Life Bldg., Montreal. 1949. $1.

Colorado Evergreens. By R. E. More. 89 pp. Illus. Denver Museum of Natural History, Denver, Colo. 1949. $2.50 ($1.50 in paper cover)

Guide to the Pacific Crest Trailway. 145 pp. Illus. The Pacific Crest Trail System Conference, Pasadena, Calif. 1950. $2.25.

Trees of the Countryside. By Margaret McKenny. 64 pp. Illus. Alfred A. Knopf, Inc., 501 Madison Ave., New York 22. 1950. $2.50 Ages 8-12.

Forest Management

Forest Management. By C. D. Orchard. 24 pp. Illus. British Columbia Forest Serv., Victoria. 1949. Free.

Forest Mensuration. By H. H. Chapman and W. H. Meyer. 522 pp. McGraw-Hill Book Co., New York 18. 1949. $5.

Forest Resources

The Appalachian Hardwoods and Their Future. By N. C. Brown. Presented, January 26, 1950 before the Annual Meeting of the Appalachian Hardwood Manuf. Assoc., Inc., 414 Walnut St., Cincinnati 2, Ohio.

Forest Resources of Northwest Florida, 1949. By J. F. McCormack. 36 pp. Southeastern Forest Expt. Sta., Asheville, N. C. 1950. Forest Survey Release No. 32. Processed.

Forest Statistics for Western and Central Tennessee. A Report of the Southern Forest Survey. 27 pp. Southern Forest Expt. Sta., New Orleans, La. 1949. Forest Survey Release No. 63. Processed.

Mississippi's Forest Industry. A Report of the Southern Forest Survey. By L. M. James and A. L. Tofte. 45 pp. Southern Forest Expt. Sta., New Orleans, La. 1949. Forest Survey Release No. 62. Processed.

The Wood Supply Situation in New York State with Special Reference to Wood for Pulping. By V. L. Harper and J. C. Rettie. 14 pp. Illus. Northeastern Forest Expt. Sta., Upper Darby, Pa. 1949. Station Paper No. 29. Processed.

Logging and Milling

Where to Buy the Four Fine Woods Douglas Fir, West Coast Hemlock, Sitka Spruce, Western Red Cedar. A Directory Showing the Capacity, Facilities, and Items Manufactured by Members of West Coast Lumbermen's Assoc., 1410 S. W. Morrison St., Portland, Ore. 1950.

Pathology

Chemical Activities of Fungi. By J. W. Foster. 604 pp. Academic Press, Inc., New York. 1949. $9.50.

Om Rötskador i Granskog och Deras Betydelse vid Framställning av Kemisk Pappersmasse och Silkemassa (Decay Injuries in Spruce Forests and Their Importance for the Production of Chemical Paper Pulp and Rayon Pulp). By Erik Björkman and others. 73 pp. Illus. Kungl. Skogshögskolans Skrifter. Royal School of Forestry Bul. No. 4. Stockholm, Sweden. 1949. 3 kr.

Protection

The Boll Weevil Can Be Stopped! Illus. folder. Clemson Agric. College, Clemson, S. C. 1950. Cir. No. 347. Free.

Control of Termites in Buildings. By Neely Turner. 8 pp. Illus. Conn. Agric. Expt. Sta., New Haven. 1949. Cir. No. 172.

Forest Fire Danger Measurement in the Eastern United States. By G. M. Jemison, A. W. Lundeenmuth and J. J. Keetch. 68 pp. Illus. U. S. Forest Serv., Washington 25, D. C. Dec., 1949. Agric. Handbook No. 1. 25 cents (Govt. Print. Off.)

Range Management

The Effect of Fertilizers on Grasses in Certain Areas in South Africa, with Special Reference to Nitrogen. By D. B. D. Meredith. 186 pp. Illus. African Explosives & Chemical Industries, Ltd., Johannesburg, U. of South Africa. 1947.

Effect of Various Intensities of Grazing Native and Reseeded Range on Meat and Wool Production. By G. J. Cholis. 9 pp. U. S. Soil Conserv. Serv., Pacific Coast Reg., Portland, Oreg. 1949.

Forest Grazing in South Alabama and West Florida. By J. J. Brasington. 22 pp. Illus. U. S. Forest Serv., Southern Forest Expt. Sta., New Orleans, La. 1949.

Soil-Root Relationships of Certain Native Grasses in Various Soil Types. By J. E. Weaver and R. W. Darland. Ecological Monographs, Duke Univ. Press, Durham, N. C. Vol. 19, pp. 303-338. October 1949.

Tread of the Longhorns. By W. Gann. 188 pp. Illus. Naylor, San Antonio, Tex. 1949. $2.75.

Recreation

Camping in South Carolina's State Parks. Illus. folder. South Carolina State Commission for Forestry, Columbia.

Silviculture

Alaska Forest Research Center Technical Notes No. 1-3. (First Records of Growth for Southeast Alaska's Young Stands; What Kind of Trees Make the Best Growth in Southeast Alaska; First Results of Thinning in Alaska.) Juneau, No. 1949. Mimeog.

Better Douglas Fir Forests from Better Seed. By L. A. Isaac. 64 pp. Illus. Univ. of Washington Press, Seattle. 1949. $1.

How to Control Southern Upland Hardwoods with Ammate. By F. A. Peevy. 7 pp. Illus. U. S. Govt. Print. Off., Washington 25, D. C. 5 cents.

Roots of Forest Trees. A Selected List of References Compiled by Duncan Dunning. 42 pp. California Forest and Range Expt. Sta., Berkeley. 1949. Forest Research Notes No. 52. Mimeog.

Skogskulturägärdernas Ekonomi. (Economy of Artificial Regeneration). By Thorsten Streyffert. 54 pp. Kungl. Skogshögskolans Skrifter. Royal School of Forestry Bul. No. 1. Stockholm, Sweden. 1949. 2 kr.

Slash Disposal in Oak-Pine Stands of Southern New Jersey. By S. Little and H. A. Somes. 12 pp. Northeastern Forest Expt. Sta., Upper Darby, Pa. 1949. Station Paper No. 31. Processed.

Tillväxtprognoser vid Skogsindelning Två Problem (Prognosis of Increment for Calculation of Cutting). Simplified Deduction of Some Statistical Formulae. By Sven Petrini. 12, 4 pp. Kungl. Skogshögskolans Skrifter. Royal School of Forestry Bul. No. 2 & 3. Stockholm, Sweden. 1949. 1 kr.

Soil Conservation

Trees and Shrubs for Erosion Control in Southern California Mountains. By J. S. Horton. 72 pp. Illus. California Div. of Forestry in cooperation with California Forest and Range Expt. Sta., Berkeley. 1949.

Soils

Bodenkunde für Landwirte, Forstwirte und Gärtner, 5th ed. By E. A. Mitscherlich. 364 pp. Illus. Mas Niemeyer verlag, Halle, Germany. 1949.

Wood Technology and Utilization

Dimension Stock and Other Uses of Aspen. By A. J. Panshin. 18 pp. Lake States Forest Expt. Sta., St. Paul. 1950. Aspen Report No. 12. Processed.

Flooring Softwoods; Their Wear and Anatomical Structure. By F. H. Armstrong. 3 pp. Illus. Great Britain Dept. of Sci. and Indus. Research, London. 1949. 9 d (His Majesty's Sta. Off.)

Timbers of South America. By P. P. Woods. 74 pp. Timber Development Assoc., Ltd., London, E. C. 4. 1949.

Wallboard Production and Uses. Report of Conference at Cambridge, Mass. September 6, 1949. 183 pp. Northeastern Wood Util. Council, New Haven 6, Conn. 1950. $4.

Society Affairs

Compiled by ROBERT D. HOSTETTER, *Assistant Executive Secretary*

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Seattle 4, Wash.

EARL PORTER,
Southern Kraft Division,
International Paper Company,
Mobile 9, Ala.

Appalachian Committee Cites Research Projects

The Appalachian Section through its Research Committee published on January 21, 1950 a list of research activities in progress in the Section during 1949 and also a bibliography of current publications by Section members.

T. H. Davis headed the committee which had as its members J. W. Cruikshank, L. T. Easley, F. A. Elliott, N. B. Goebel, I. T. Haig, C. M. Kaufman, J. W. O'Byrne, E. B. Price, R. B. Thomson, and H. Work.

The committee devoted its activities to the compilation of information on all forest research subjects with the exception of forest products research.

Seventeen firms and agencies which conducted 156 research projects in 1949 are listed. These projects included a comparison of financial profitability of varying forest management methods, reinforcement plantings, grazing, fire behavior, littleleaf disease, dying of redcedar, hardwood control, direct seeding, pulpwood and sawlog harvesting machinery, and many other subjects vital to good forestry.

Primary purpose of the report is to coordinate the work of all agencies and to enable the members of the Section to know what research work is in progress.

Ninety-nine publications during 1949 by members of the Appalachian Section are listed in the report.

Correspondence concerning availability of the Research Committees' report should be directed to P. A. Griffiths, secretary-treasurer of the Appalachian Section. His address is Department of Conservation and Development, Raleigh, N. C.

Ethics Syllabus Available

"A Syllabus on Professional Ethics as they relate to the Profession of Forestry," prepared for the Society of American Foresters by Archie E. Patterson of the School of Forestry, University of Georgia, has been issued by the Society.

Prof. Patterson undertook this assignment under authorization of the Council. His syllabus has been approved by the committee that drafted the code of ethics for the forestry profession, which the membership of the Society adopted by letter ballot on November 12, 1948. The members of this committee were Julius Kahn, chairman; H. H. Chapman, Henry Clepper, Charles F. Evans, and Stuart Moir.

The syllabus is intended primarily for teachers of forestry. Single copies may be obtained on request to the Society at a charge of 25 cents each.

Members are also reminded that the Society has recently issued the Code of Ethics of the profession of forestry, attractively printed in black and green on heavy paper, 13 by 20 inches, suitable for framing. A charge of 25 cents each is made to cover costs of press-work, mailing tube, and postage.

Washington, D. C. Section Assists Local Schools

A plan to assist teachers of the District of Columbia elementary school system in presenting forestry and other conservation subjects to their students has been developed recently by the School Committee of the Washington, D. C. Section in cooperation with the Board of Education. Charles W. Mattison is chairman of the committee. Other members are G. Harris Collingwood, Albert G. Hall, and Donald Rochester.

The Section will conduct conservation field trips for school administrators and teachers commencing in the fall of 1950. Another phase of the project will be the compilation of packets of selected, existing supplementary conservation teaching aids which, upon the approval of the superintendent in charge of elementary schools, will be made available for classroom use. In addition, the Section is prepared to supply technical advice on forestry to curriculum specialists, teachers, and administrators who request it.

New Chapters Formed

Proposals to establish Chapters in the vicinities of Portland, Oreg., Boise, Idaho, and Philadelphia, Pa., have been discussed at recent meetings of the Columbia River, Intermountain, and Allegheny Sections.

At present there are sixty Chapters which are functioning in the twenty-one Sections.

Section Representatives Describe S.A.F. Program To Forestry Students

In cooperation with the membership committees of the twenty-one Sections, Section representatives at the twenty-two accredited forestry schools are currently carrying out a program designed to enable forestry students to become better acquainted with the objectives and activities of the Society of American Foresters. Copies of a brochure describing the functioning of the Society and containing the Code of Ethics of the forestry profession are being distributed this spring to the more than 2,000 graduating seniors.

In several instances, leaders in the forestry profession have met with students in their classrooms or at forestry club meetings to discuss the part the Society plays in enabling foresters to continue their training in practical and theoretical forestry following their graduation from college.

In other cases, Section officers have assisted forestry students in planning joint meetings of forestry clubs with Sections or Chapters.

Charles I. Miller, the Central States Section's representative at Purdue University, has compiled the results of student contacts during 1949 at that forestry school. Two weeks before a class graduated in February 1949, the benefits of Society membership were explained to each graduating senior. At that time each was given a membership application form. A week later, those students who had not yet returned completed forms to a faculty member on the Society membership committee were contacted again. As a result, all members of the graduating class applied for membership. In the course of the year two-thirds of the class actually accepted election.

The June graduates at Purdue were contacted only once concerning Society membership, resulting in 68 percent applying for membership. Forty-eight percent of the June class became members, giving an average for the year of 54 percent of the 46 graduates who became members of the Society during the year in which they graduated.

Both Mr. Miller and Roy C. Brundage, chairman of the Central States Section, emphasize the desirability of pointing out to students before graduation the benefits to be derived from Society membership. Although over half of the graduates who did not become members as a result of school contacts are now in forestry work, none of them has subsequently applied for membership.

Great Value Placed On Society Membership

In a personal letter to each student graduating in forestry in February from the University of Florida, Professor H. S. Newins, director of the School of Forestry, said, "There is no other single investment which you could possibly make at this time that will reward you professionally so much as membership in the Society."

Coming Events

Kentucky-Tennessee Section

The Kentucky-Tennessee Section will hold its annual summer meeting at Kentucky Ridge State Forest, Pineville, Ky. on June 2 and 3, 1950. Harry Nadler of Pineville and George Walters of Corbin, Ky. are in charge of arrangements.

Wood Industries Division

The Wood Industries Division of the American Society of Mechanical Engineers and interested members of the Society of American Foresters will meet at the Hotel Statler, Washington, D. C. on April 12, 13, and 14, 1950.

Gulf States Section

The Gulf States Section will hold its annual meeting on May 4, 5, and 6 at the Heidleberg Hotel, Jackson, Miss.

Contact John W. Squires, chairman, Jackson, Miss., or James Bryan, secretary-treasurer, Perkinston, Miss., for details.

Columbia River Section Leads in Membership

With a total of 552 members, the Columbia River Section led all others in that respect according to a tally that was made as of February 1, 1950. A summary is presented in Table 1. Close behind the Columbia River Section were the Northern California and Southeastern Sections with 510 and 494 members respectively. All three of these Sections have actively functioning Chapters.

For the first time since 1923 there are now more members in the advanced grade than in the probational grade, there being 3,199 Members and 2,717 Junior Members on February 1. An additional 300 Juniors are eligible for "automatic" advancement this year.

Following four years of rapid increases in membership, the total is at an all-time high now, with a continuing rise in membership expected to bring the total to over 7,000 during the Golden Anniversary year.

Table 1.—S.A.F. Membership by Sections, February 1, 1950.

Section	Rank	Total	Junior	Member	Fellow	Affiliate	Associate
1. Allegheny	4	433	190	216	3	7	17
2. Appalachain	5	426	198	213	2	9	4
3. Central Rocky Mountain	13	232	67	155	1	6	3
4. Central States	9	375	199	159	2	6	9
5. Columbia River	1	552	271	245	5	20	11
6. Gulf States	7	391	177	185	2	14	13
7. Inland Empire	20	143	73	65	1	2	2
8. Intermountain	16	163	61	102	0	0	0
9. Kentucky-Tennessee	19	153	48	94	0	5	6
10. New England	6	424	150	228	6	26	14
11. New York	8	350	156	176	3	6	9
12. Northern California	2	510	197	264	4	30	15
13. Northern Rocky Mountain	18	154	61	89	2	1	1
14. Ozark	15	192	84	91	1	14	2
15. Puget Sound	10	309	140	148	2	11	8
16. Southeastern	3	494	256	199	5	18	16
17. Southern California	21	81	24	49	2	3	3
18. Southwestern	17	160	79	77	0	1	3
19. Upper Mississippi Valley	11	262	126	112	3	13	8
20. Washington, D. C.	14	201	25	133	13	0	30
21. Wisconsin-Upper Michigan	12	258	101	139	0	8	10
No Section Affiliation[1]		99	34	60	2	0	3
Corresponding Members		53					
Honorary Members		13					
Total Membership		6,428	2,717	3,199	59	200	187

[1]Includes members in U. S. and foreign countries who have requested that they not be designated as members of any Section.

Queries and Quotes

"We would like to obtain certificates of our Membership in the Society to frame and hang in our office. Also we would like a copy of the professional forester's Code of Ethics suitable for similar use.

"We have been observing an increasing trend for engineers in public work to display evidences of their professional standing. We intend to keep up with them, and will encourage the other foresters in our organization to do the same."—RJR and CSH

That's the spirit! Code of Ethics suitable for framing is 25 cents; Member certificate is $1.00.—RDH

"My membership in the Society means a great deal to me in maintaining professional association with other foresters as well as a means of keeping up to date on new developments in our field."—CET

"One thing [our Section] needs is a budget. . . . We want to include in this budget, among other things, sufficient funds to send a delegate to the national meeting. . . . Any suggestions for our [Policy and Planning] Committee will be appreciated."—HAH

The Society office will be glad to receive and forward all suggestions.—RDH

"I am no longer connected with forestry in any way except that of interest. . . . Under these circumstances, I doubt that I should be kept in my present classification, but think I might be classified as an Associate Member."—WEW

Since eligibility for the three voting grades of membership in the Society is based primarily upon academic training or its equivalent rather than interest, a man once qualified does not cease to be qualified for the highest grade of voting membership attained even though his subsequent occupations may change. Once a forester, always a forester!—RDH

"I personally believe that [dues] should be payable by Canadian members in Canadian funds."—GGC

Canadian funds are acceptable for dues, but not for subscriptions. And while on the subject of dues, in the U. S., at least, they are "deductible" on income tax reports.—RDH

"Is a forest ranger allowed to do fishing and hunting during the seasons, or does the job take up most of his time?"—RU

All that and camping, too!—RDH

Intermountain Section To Meet With Students

At a meeting of the executive and program committees of the Intermountain Section on January 19, a joint meeting with the Utah State Agricultural College Forestry Club was tentatively planned. Present were Lincoln Ellison, J. A. Libby, J. Whitney Floyd, Paul Grossenbacb, F. C. Koziol, and Odell Julander.

J. Whitney Floyd suggested that this be a regular Section meeting with forestry students participating. He said that such a meeting would be very desirable and could be easily arranged.

Cummings Heads Committee

W. H. Cummings, chief of the Forest Management Investigations Section of the Division of Forestry Relations, Tennessee Valley Authority, Norris, Tenn., has been appointed chairman of the Committee on Hydraulics and Forest Influences to help compile the Forester's Field Manual. Mr. Cummings succeeds the late L. V. Kline who died suddenly on January 31.

The others members of this committee are E. G. Dunford, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.; C. R. Hursh, Route 3, Box 660, Asheville, N. C.; and Howard W. Lull, U.S. Forest Service, Washington 25, D. C.

Forest Management Is Allegheny Theme

Forest management was the theme of the twenty-eighth annual meeting of the Allegheny Section held in Philadelphia, Pa. on February 15, 16, and 17, 1950, which was attended by over 200 members and guests.

An innovation of the meeting was an informal gathering on the evening of February 15 at which time members in attendance could become better acquainted. Section committees also held open meetings that evening.

After an address of welcome by Chairman M. W. Humphrey on the morning of February 16, Maurice K. Goddard, chairman of the public relations committee, introduced several distinguished visitors and presented them with small southern balsam fir trees.

Featured talks at the morning session were, "How Small Woodlot Owners Are Making the Woodlot a Paying Portion of the Farm" by Paul L. Coates, president of Woodland Products, Inc., Coatesville, Pa., and "Some Economic Aspects of Private Forestry" by Robert C. Fraunberger, vice president of Southeastern Industries, Inc., Philadelphia, Pa.

Reports by the committees on forest management, research, economics, and employment policies and standards occupied the afternoon. State Senator E. Paul Burkholder of Delaware and Nelson H. Fritz were speakers at the banquet that evening.

Committee reports on subjects dealing with Society operation were given on February 17 and the meeting was concluded with the annual business meeting of the Section. Among several resolutions adopted was one which would establish a committee for the purpose of drawing up a tentative model law for the licensing of foresters.

Officers installed were: chairman, J. Ira Kolb, Parvin State Park, R.D. No. 1, Elmer, N. J.; vice chairman, M. K. Goddard, Pennsylvania State Forest School, Mont Alto, Pa.; and secretary-treasurer, J. Howard Mendenhall, 405 F & M Building, West Chester, Pa. Mr. Goddard also serves as chairman of the membership committee. D. E. Hess and W. S. Swingler were elected members of the executive committee.

Ohio Chapter Visits Buckeye Branch Station

Reports of the activities state and federal forestry organizations in Ohio and a discussion of Ohio University's interest in the forestry program of the state were features of the meeting of the Ohio Chapter of the Central States Section which was held on February 20, 1950 at Athens, Ohio.

Demonstrations in laboratory techniques by the staff of the Buckeye Branch, Central States Forest Experiment Station, were also presented.

"Forest Resources" Wanted

Albert C. Cline, Division of Forest Economics, U. S. Forest Service, Washington 25, D. C. would like to obtain from one to three sets of "Forest Resources of the World" by Zon and Sparnawk. Two volumes comprise each set. Published in 1923, the books are now out of print, but Mr. Cline would like to hear from any member who has them.

Ozark Section Sees Hardwood Utiliaztion

The winter meeting of the Ozark Section was held at Fort Smith, Ark. on February 3 and 4. About 125 members and guests attended.

Following registration on the first morning, the members made a tour of the Ballman-Cummings Furniture plant to inspect the modern utilization of hardwoods.

In the afternoon, the program featured two technical sessions. E. W. Johnson, silviculturist for the Southern Great Plains Field Station at Woodward, Okla., presented a paper on tree and shrub investigations carried on by the station.

A second feature of the program was a panel discussion on how to educate and prepare men for forestry work. Moderator was Glen R. Durrell of Oklahoma A & M College. Participating on the panel were H. H. Chamberlin of Arkansas A & M College; Arthur Meyer of the Missouri Conservation Commission; and Douglas K. Bemis of the Ozan Lumber Company.

At the evening dinner meeting in the Goldman Hotel, Fred H. Lang, state forester of Arkansas, officiated as toastmaster; and presented, in behalf

of the Section, an oak plaque in the form of the S.A.F. emblem to Clarence F. Byrns, editor of the Fort Smith *Southwest American and Times-Record*, as Man of the Year in forestry. Talks were given by President Charles F. Evans and Henry Clepper, executive secretary. The program was concluded with the showing of a new motion picture of forestry in Oklahoma.

At the final business session, at which Robert H. Clark, chairman, presided, reports were given by several Section committees. Following a report by R. R. Reynolds, the Section members voted unanimously to invite the Council to hold the Society's annual 1951 meeting in Little Rock.

Society officials attending the winter meeting of the Ozark Section on February 3 and 4 included those pictured above L. to R.: Henry Clepper, S.A.F. executive secretary; Gordon B. Hartrick, secretary-treasurer, Ozark Section; Nat Walker, vice chairman, Ozark Section; William E. Towell, chairman, Ozark Section; Robert H. Clark, former chairman, Ozark Section; and Charles F. Evans, S.A.F. president.

The following officers were installed for the coming year: chairman, William E. Towell, assistant state forester, Jefferson City, Mo.; vice chairman, Nat Walker, 344 Adm Road, Stillwater, Okla.; secretary-treasurer, Gordon B. Hartrick, Fountain Hill, Ark.

The Section's midsummer meeting will be held at Harrison, Ark.

Longleaf Group Meets With ASAW

The 47th annual meeting of the Association of Southern Agricultural Workers was held at Biloxi, Miss., February 9, 10, and 11.

One of 15 separate conference groups in the association, the Forestry Section, with a total attendance of more than one hundred, held four sessions—three indoor meetings and a field trip. D. J. Weddell presided.

The first day's session featured a symposium on aerial photography with J. E. Bryan, Jr., L. N. Dantzler Lumber Company, Perkinston, Miss., as chairman. Papers were read by George W. Stanley, associated with Pomeroy & McGowin of Monticello, Ark., and by Robert M. Campbell, Scotch Lumber Company, Fulton, Ala.

At a second session, held jointly with the Soil Conservation Section, Monty Payne of Mississippi State College presided. Papers were presented by Ivo Miller, Yazoo-Tallahatchie Flood Control Project, Oxford, Miss.; Charles L. Gouffon, Tennessee Valley Authority, Norris, Tenn.; J. A. Gibbs, Soil Conservation Service, Spartanburg, S. C.; and D. E. Lauderburn, Soil Conservation Service, Hattiesburg, Miss.

At the third technical session, T. D. Stevens of Alabama Polytechnic Institute presided. The speakers were T. S. Coile of the Duke University School of Forestry; Lee Chaiken, Southeastern Forest Experiment Station; and William A. Duerr of the Southern Forest Experiment Station. These papers were followed by a luncheon at which J. Herbert Stone, regional forester of the U.S. Forest Service at Atlanta, gave an illustrated talk on the Third World Forestry Congress at Helsinki, Finland.

Another feature of the convention was a dinner meeting for the foresters and their friends, arranged by the Longleaf Group of the Gulf States Section, Society of American Foresters, under the direction of David Bruce, John G. Guthrie, and Randle J. Dedeaux, chairman. Henry Clepper, S.A.F. executive secretary, was the principal speaker.

Concluding the forestry activities was a field trip to the Harrison Experimental Forest of the Southern Forest Experiment Station and the DeSoto National Forest.

Newly elected officers of the Forestry Section are N. B. Goebel, chairman, South Carolina Experiment Station, Clemson College, Clemson, S. C.; Cecil E. Clapp, vice chairman, U. S. Forest Service, Atlanta, Ga.; and William Barker, secretary-treasurer, Extension Service, Clemson College, Clemson, S. C.

New England Section Holds Winter Meeting

The New England Section held its winter meeting at the Somerset Hotel, Boston, on February 23-24 with more than 200 members and guests attending.

The Section voted to hold the summer meeting at a date not yet decided in Kingston, R. I., using facilities of Rhode Island State College.

Officers elected were: chairman, William C. MacAdam, Francestown, N. H.; vice chairman, Robert S. Monahan, Hanover, N. H.; and secretary-treasurer, Edwin L. Giddings, Great Works, Me. Mr. Monahan also serves as membership chairman. Vacancies in the executive council for Maine and Rhode Island were filled by Elmer G. Kelso and Edgar W. Killian, respectively.

Bradford Washburn, director of the Boston Museum of Science, was the banquet speaker with a well-received talk on the "Conquest of Mount McKinley," illustrated with color movies and slides.

A panel discussion of the New Hampshire Timber Tax and Conservation Law, which became effective April 1, was conducted by five of the leading proponents of this measure: John H. Foster, state forester; Representative Wakefield Dort, chairman of the House Forestry and Recreation Committee; Henry I. Baldwin, assistant state forester; Lawrance W. Rathbun, forester of the Society for Protection of New Hampshire Forests; and Kenneth E. Barraclough, state extension forester.

The principal papers were presented on the following subjects: "Forestry on the Larger Holdings of the Northeast" by Elmer G. Kelso, chief forester, Hollingsworth & Whitney Co.; "Forestry on the Smaller Holdings of the Northeast" by Harris A. Reynolds, forester, New England Forestry Foundation and Massachusetts Forest and Park Association; "The Forester in Timber Operating" by William P. House; "Hardwood Utilization in Southern New England" by Wm. C. MacAdam, pulpwood manager, Champion International Company; "The Work of the Forest Service in New England, and a Look Ahead" by Wm. S. Swingle, Eastern Regional Forester, U. S. Forest Service, and "Diseases and the Forest" by L. M. Hutchins, chief, Division of Forest Pathology, U. S. Dept. of Agriculture.

Society affairs were discussed by Robert D. Hostetter, assistant executive secretary, and Dwight B. Demeritt, newly elected Council member from the Northeast.

The following resolution was passed by the members present:

"In view of the position of past Councils as stated in the following excerpts: The referendum of the Society in 1942 which reads:

> This statement of the Council's position must not be interpreted as endorsement now or later of any bill which may be introduced. We urge the members of the Society to scrutinize carefully and be prepared to criticize constructively all legislation proposed in order that our profession may contribute to the fullest its knowledge and experience.

and which was confirmed by the last Council. JOURNAL OF FORESTRY, February 1950, page 143, which reads:

> The Council is opposed to referenda referring to specific legislative proposals. They often include different items which cannot be dealt with by a single overall vote. Furthermore, bills are so frequently amended, from stage to stage, that a referendum may quickly become out of date and be no longer applicable to amended bills or similar bills introduced later.

the members of the New England Section meeting in Boston on February 24, 1950 unanimously hold that if the pending referendum on federal regulation of private forests is adopted, the Council should take action actively opposing the passage of any specific bill in Congress aiming at securing federal power over private forest lands within the states, and that in view of the situation created by the referendum of 1942, the Council should act either in favor of or in opposition to any federal legislation on which the Society's policy has been established."

Ponderosa Pine Used In Luggage Construction

Utilization of wood in the manufacture of luggage was discussed by Louis Degan, production manager of Shwayder Bros. Inc., at the January 20 meeting of the Central Rocky Mountain Section. He said that ponderosa pine is used for top, bottom, and end pieces of Samsonite luggage while one-eighth inch yellowpoplar plywood is used for sides. The wooden members are electronically glued and are covered with poly-vinyl acetate.

As a second feature of the program Col. Allen S. Peck gave a resume of the history and purpose of the Colorado Engineering Council, of which the Central Rocky Mountain Section has been a member since 1926. The purpose of the council is to coordinate the work of its member technical organizations which now number 20, representing 4,000 individuals.

Southeastern Section Discusses Duties, Ethics, Education of Foresters

The annual winter meeting of the Southeastern Section was held in the Whitley Hotel, Montgomery, Ala. on January 27 and 28. Chairman R. Vance Miles presided at the opening session, which was devoted to Section business, a report on Society affairs by Henry Clepper and the installation of new officers as follows: chairman, B. E. Allen, Savannah, Ga.; vice chairman, C. H. Coulter, Tallahassee, Fla.; and secretary-treasurer, James F. Spiers, Statesboro, Ga.

The program featured three panel discussions; the first on the education of a forester. Chairman Allen acted as moderator. Others participating were James F. Spiers, Carl E. Ostrom, Clark Matteson, and Frank F. Smith.

A second panel discussion had as its subject the duties and activities of a forester. Edward C. Gates was moderator. Those participating were Clarence Dietterich, C. H. Coulter, James Owens, Oscar G. Traczewitz, and Ivan Martin.

The third panel dealt with the ethics of the forestry profession with Charles F. Evans as moderator. Participating were T. D. Stevens, Floyd Cossitt, T. I. Liefeld, B. F. Grant, and Harold S. Newins.

Concluding the two-day conference was the Section's annual dinner. Paul S. Swarthout served as toastmaster, and Col. J. H. Eddy gave the principal address.

About 265 members and guests attended the meeting, the program of which had been arranged by C. F. Attaway, Hugo J. Pawek, William R. Sizemore, Robert L. Snyder, Paul Swarthout, and Fred Vogel.

Southern Californians See Hunting Pictures

B. H. Paul showed some slides of a hunting trip in southeastern Utah as a feature of the January 20, 1950 meeting of the Southern California Section.

On February 17, the Section had as its speaker F. B. Laverty who discussed "Current Upstream Flood Control Measures in Los Angeles County." Mr. Laverty is chief engineer of the hydraulic division, Los Angeles County Flood Control District.

Both meetings were held in Arcadia, Calif.

Two New Chapters Receive Charters

At the meeting of the Columbia River Section on February 3, the two newest Chapters of that Section were presented with charters by Ernest L. Kolbe, chairman. James E. Sowder received the charter for the Deschutes Chapter and Edward S. Kotok received the charter for the Umpqua-Coquille Chapter.

Discussion of the Washington and Oregon forest practice laws by Mike Webster and Leland Harter, respectively, constituted the main part of the program.

On March 3, R. L. Furniss presented "Some Views on Japanese Forestry" in an illustrated talk to the Section.

Wages, Taxes Discussed In Louisiana Meetings

Application of the wage and hour law to forest workers was the primary subject of discussion by the North Louisiana Group of Foresters at the meeting of February 13 at Winnfield, La.

On February 24 the group heard Ralph W. Marquis of the division of forest economics, U. S. Forest Service, Washington, D. C. talk about forest taxation.

Candidates for Membership

Candidates for membership whose applications were received in the Society office prior to March 1, 1950 are listed below. Names, positions, addresses, education, and endorsers are given.

Action regarding the eligibility of these candidates will be taken by the Council as of May 1, 1950. Comments, protests, or important information regarding the qualifications for membership of candidates listed are invited from present voting members. All such communications are kept strictly confidential, being used only by the Council in taking final action on applications. Correspondence should be received in the Society office prior to May 1, 1950.

The names of those candidates who are elected will be published in the Society Affairs department of the June 1950 Journal of Forestry. The names of those who signify their acceptance of election will be published in subsequent issues of the Journal.

Allegheny Section

Junior Grade

Berthy, H. P., Ext. Worker, W. Va. Ext. Service, Charleston, W. Va.; W. Va., B.S.F., 1950. A. W. Goodspeed, W.C. Percival, G. G. Marra.

Bivens, J. J., Farm Forester, Cons. Comm. of W. Va., Charleston, W. Va.; W. Va., B.S.F., 1949. J. B. Byers, A. W. Goodspeed, C. J. Johnson.

Cantrell, J. O., 509 Glover St., Charleston, W. Va.; W. Va., B.S.F., 1950. A. W. Goodspeed, W. C. Percival, G. G. Marra.

Cuppett, D. G., Farm Forester, W. Va. Cons. Comm., Spencer, W. Va.; W. Va., B.S.F., 1950. A. W. Goodspeed, W. C. Percival, G. G. Marra.

Dick, D. L., Mgr., Nittany Tbr., Inc., State College, Pa.; Pa. State, B.S.F., 1950. H. H. Chisman, H. A. Meyer, W. C. Bramble.

Dunn, D. B., 709 Frantz Ave., Mullens, W. Va.; W. Va., B.S.F., 1950. A. W. Goodspeed, W. C. Percival, G. G. Marra.

Hiner, J. M., Durbin, W. Va.; W. Va., B.S.F., 1950. A. W. Goodspeed, W. C. Percival, G. G. Marra.

Kennedy, F. X., Sr. Forester, Dept. Forests and Waters, Clarion Pa.; Pa. State, B.S.F., 1949. R. S. Frankenburger, C. Bittinger, M. W. Humphrey.

King, R. H., 340 Grandview Ave., Morgantown, W. Va.; W. Va., B.S.F., 1950. G. G. Marra, M. Brooks, C. B. Myers, Jr.

Lathrup, D. E., Jr., 143 Second St., Trenton, N. J.; Univ. of Mich., B.S.F., 1950. S. W. Allen, J. W. Brown, J. Carow.

Longwell, J. R., Student, Pa. State, State College, Pa.; Pa. State, B.S.F., 1949. H. H. Chisman, V. A. Beede, W. E. White.

Lynch, D. G., Farm Forester, Cons. Comm., Charleston, W. Va.; W. Va., B.S.F., 1949. E. H. Tryon, W. C. Percival, A. W. Goodspeed.

McNair, J. W., Jr., 25 Forest Rd., Wayne, Pa.; Pa. State, B.S.F., 1950. H. H. Chisman, H. N. Cope, W. C. Bramble.

Reed, M., Farm Forester, Con. Comm., Charleston, W. Va.; W. Va., B.S.F., 1949. E. H. Tryon, W. C. Percival, A. W. Goodspeed.

Rossman, W. R., Student, Pa. State, State College, Pa.; Pa. State, B.S.F., 1950. H. H. Chisman, H. S. Meyer, V. Beede.

Russ, D. F., Grad. Asst., Pa. State College, State College, Pa.; Univ. of Minn., B.S.F., 1949. H. H. Chisman, A. A. Schmidt, V. Beede.

Ruth, G. F., Grad. Student, W. Va. Univ., Morgantown, W. Va.; W. Va., B.S.F., 1950. A. W. Goodspeed, W. C. Percival, G. G. Marra.

Swink, F. N., Jr., Asst. Dist. Game Mgr., Cons. Comm., Charleston, W. Va.; W. Va., B.S.F., 1949. C. A. Myers, Jr., A. W. Goodspeed, C. J. Johnson.

Vorbach, M. J., 2127 Univ. Ave., Morgantown, W. Va.; W. Va., B.S.F., 1950. A. W. Goodspeed, W. C. Percival, E. H. Tryon.

White, R. E., East Waterford, Pa.; Pa. State, B.S.F., 1950. H. H. Chisman, W. C. Bramble, H. N. Cope.

Appalachian Section

Junior Grade

Barber, J. C., Grad. Student, N. C. State College, Raleigh, N. C.; N. C. State, B.S.F., 1950. C. M. Kaufman, J. V. Hofmann, R. M. Carter.

Dellinger, H. C., Grad. Student, N. C. State College, Raleigh, N. C.; N. C. State, B.S.F., 1949. C. M. Kaufman, J. V. Hofmann, R. M. Carter.

Gravely, J. A., Forester, Poinsett Lbr. & Mfg. Co., Pickens, S. C.; N. C. State, B.S.F., 1950. W. J. Barker, H. C. Rettberg, R. L. Chastain.

Harris, A. R., Farm Forester, N. C. Dept. of Cons. & Dev., Raleigh, N. C.; N. C. State, B.S.F., 1949. C. M. Kaufman, J. V. Hofmann, G. K. Slocum.

Munger, E. L., Forester, Va. Forest Service, Bristol, Va.; N. C. State, B.S.F., 1949. C. M. Kaufman, R. J. Preston, G. K. Slocum.

West, P. M., Jr. Engr., N. C. State Highway Comm., N. Wilkesboro, N. C.; N. C. State, B.S.F., 1949. C. M. Kaufman, W. D. Miller, G. K. Slocum.

White, J. B., Research Asst., N. C. State, Raleigh, N. C.; Univ. of Ga., B.S.F., 1948. C. M. Kaufman, J. V. Hofmann, R. M. Carter.

Wynne, O. T., Asst. Dist. Forester, N. C. Forest Service, Raleigh, N. C.; N. C. State, B.S.F., 1949. C. M. Kaufman, J. V. Hofmann, G. K. Slocum.

Member Grade

Bartholomew, R. J., c/o Va. Forest Service, Portsmouth, Va. Appalachian (Jr. member, 1944).

Bethel, J. S., School of Forestry, N. C. State, Raleigh, N. C. Appalachian (Jr. member, 1939).

Brewer, W. L., Box 65, Bolton, N. C. Appalachian (Jr. member, 1944).

Collins, D. E., Box 93, Whitmire, S. C. Appalachian (Jr. member, 1944).

Griffith, J. W., P.O. Box 392, Altavista, Va. Appalachian (Jr. member, 1944).

Heilman, J. F., R.F.D. #1, Aiken, S. C. Appalachian (Jr. member, 1944).

Hill, W. B., Jr., 2915-D Adams St., Wilmington, N. C. Appalachian (Jr. member, 1937).

Howard, L. E., Rt. #3, Georgetown, S. C. Appalachian (Jr. member, 1944).

Reed, R. E., Box 102, Smithfield, N. C. Appalachian (Jr. member, 1944).

Winkworth, R. C., 216 Pollock St., New Bern, N. C. Appalachian (Jr. member, 1944).

Affiliate Grade

Gibson, M. C., Pres., Cape Fear Wood Corp., Elizabethtown, N. C. Appalachian.

Central Rocky Mountain Section

Junior Grade

Luckinvill, A. L., Dist. Forest Rgr., U.S.F.S., Cody, Wyo.; Colo. A & M., B.S.F., 1934. Reinstatement.

Pierce, C. B., Jr., Forestry Aid, Dept. of Agric., U.S.F.S., Glenwood Springs, Colo. Colo. A & M., B.S.F., 1949. N. E. Rouillier, W. Langdon, C. D. Clark.

Staples, W. R., Forester, U.S.D.A., Denver, Colo.; Colo. A & M., B.S.F., 1948. J. L. Deen, W. Schaeffer, J. V. K. Wagar.

Thomas, W. D., Assoc. Prof., Colo. A & M., Ft. Collins, Colo.; Colo. A & M., B.S.F., 1939. Univ. of Minn., M.S., Ph.D., 1946. D. F. Herney, J. V. K. Wagar, J. L. Deen.

Wasser, C. H., Acting Head, Dept. of Grazing & Range Mgmt., Colo. A & M., Ft. Collins, Colo.; Univ. of Ariz., B.S., 1937; Colo. A & M., M.F., 1948. J. L. Deen, W. Schaeffer, J. V. K. Wagar. (Assoc. member, 1946).

Member Grade

Benson, R. J., c/o U.S.F.S., Gunnison, Colo. Central Rocky Mountain (Jr. member, 1944).

Johnson, W. M., Rocky Mt. Forest & Range Exp. Sta., Ft. Collins, Colo. Central Rocky Mountain (Jr. member, 36R49).

Orr, S. W., c/o U.S.F.S., Idaho Springs, Colo. Central Rocky Mountain (Jr. member, 1944).

Wright, M. M., Box 76, Dolores, Colo. Central Rocky Mountain (Jr. member, 1944).

Central States Section

Junior Grade

Anderson, L. H., Co-owner, Anderson Bros. Grocery and Markets, Michigan City, Ind.; Purdue, B.S.F., 1940. A. M. Herrick, C. S. Miller, B. N. Prentice.

Anderson, M. G., R.R. #1, Osgood, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Broomall, C. O., 1337 North Huey St., South Bend, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Brown, C. C., 2730 N. LaSalle St., Indianapolis, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Datena, J. F., 522 Harrison St., Elkhart, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Eversole, K. R., 2602 Weisser Park Ave., Ft. Wayne, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Faulkner, C. R., Grad. Asst., Purdue Univ., W. Lafayette, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, B. N. Prentice, C. S. Miller.

Fleishman, W. J., 452 Mill Rd., Ravenna, Ohio; Utah State, B.S.F., 1950. C. M. Bowen, J. W. Floyd, T. W. Daniel.

Heintzberger, H., 123 State St., Mishawaka, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Hendricks, F. P., 700 N. Wabash Ave., Hartford City, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Hyatt, W. G., 304 E. Walnut St., Washington, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

John, I. E., Jr., 1222 W. Ottawa, Lansing, Mich.; Mich. State, B.S.F., 1949. P. A. Herbert, K. Dressel, P. W. Robbins.

Johnson, W. F., 1004 E. Main St., Crawfordsville, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Kalweit, E. 308 Mills St., Crawfordsville, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Kovatch, J. G., 3226 S. Main St., South Bend, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Kutsch, J. N., Grad. Student, Univ. of Mich., Ann Arbor, Mich.; Univ. of Mich., B.S.F., 1949. S. W. Allen, J. W. Brown, J. Carow.

Leach, E. R., 31 Washington St., Mt. Clemens, Mich.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Listenberger, F. L., 217 Williams St., Argos, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Mansel, G. T., Courthouse Franklin County, Brookville, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Miles, W. F., Sr. Partner, Miles & Owens Tree Trimmers, Lafayette, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Nelson, T. C., Grad. Asst., Mich. State College, East Lansing, Mich.; Univ. of Wis., B.S., (Agronomy), 1943; Mich. State, M.S. (Forest Pathology), 1947. M. W. Day, H. A. Barton, W. M. Zillgitt.

Owen, A. M., 1922 Walnut Lane, Evansville, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Parker, M. D., 1826 Howell St., Ft. Wayne, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Roberts, D. E., 2750 E. 62nd St., Indianapolis, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Sarles, R. L., Grad. Student, Univ. of Mich., Ann Arbor, Mich.; Univ. of Mich., B.S.F., 1950. S. W. Allen, J. W. Brown, R. Craig, Jr.

Schick, H., City Forester, Parks & Recreation, Pontiac, Mich.; Mich. State, B.S.F., 1949. P. A. Herbert, K. Dressel, P. W. Robbins.

Smeltzer, D. A., 1555 Baker St., Gary, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Steckel, K. E., 11645 West Fowler Ave., W. Lafayette, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Stiles, H. E., Grad. Student, Mich. State, East Lansing, Mich.; Mich. State, B.S.F., 1949. P. A. Herbert, Karl Dressel, P. W. Robbins.

Stricker, L. C., Grad. Student, Univ. of Mich., East Lansing, Mich.; Univ of Mich., B.S.F., 1949. S. W. Allen, W. W. Chase, S. A. Graham.

Thomar, J. D., 4630 N. Clarendon Ave., Chicago, Ill.; Utah State, B.S.F., 1950. E. R. Moore, T. W. Daniel, J. W. Floyd.

Van Matre, G. H., Van Matre Mfg. Co., New Castle, Ind.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

White, G., 427 N. Walnut St., Bryan, Ohio; Univ. of Mich., B.S.F., 1950. S. W. Allen, J. W. Brown, J. Carow.

Wiemer, R. E., 817 Lexington Blvd., Royal Oak, Mich.; Univ. of Mich., B.S.F., 1950. S. W. Allen, K. C. Davis, S. T. Dana

Member Grade

Arnold, C. L., Instructor and Forest Supv., Mich. State, East Lansing, Mich. Central States (Jr. member, 1941).

Monroe, A. F., Forestry Spec., S.C.S., East Lansing, Mich. Central States (Jr. member, 1934).

Associate Grade

Gilles, B., Mgr., St. Meinrad Abbey, St. Meinrad, Ind. Central States.

Columbia River Section

Junior Grade

Ayers, J. H., Tbr. Sales Officer, U.S.F.S., Prospect, Oregon; Univ. of Mich., B.S.F., 1942. L. G. Jolley, H. Chriswell, G. R. Leavengood.

Bailey, J. H., Logging Engr., Douglas Tbr. Corp., Drain, Ore.; Univ. of Wash., B.S.F., 1949. G. D. Marckworth, D. M. Covington, P. G. Haddock.

Birch, B. E., Tech. Asst., Oregon State Board of Forestry, Veneta, Ore.; Oregon State, B.S.F., 1949. H. R. Oglesby, P. M. Dunn, W. F. McCulloch.

Carpenter, R. H., Engr. Asst., Valsetz Lbr. Co., Valsetz, Ore.; Univ. of Mich., B.S.F., 1942. L. O. Barrett, K. Wood, J. C. Dozier.

Compton, L. M., Dist. Warden, Oregon State Board of Forestry, La Grande, Ore.; Oregon State, B.S.F., 1943. Reinstatement.

Ferguson, R. M., Inventory Forester, Weyerhaeuser Tbr. Co., Longview, Wash.; Univ of Mich., B.S.F., 1950. S. W. Allen, J. W. Brown, R. Craig, Jr.

Fisher, G. D., Fire Control Aid, U.S.F.S., Parkdale, Ore.; Oregon State, B.S.F., 1950. R. F. Keniston, R. A. Yoder, W. F. McCulloch.

Member Grade

Appleby, R. W., U.S.F.S., Union Creek, Oregon. Columbia River (Jr. member, 1944).

Hiatt, H. C., 7805 S.E. 35th, Portland, Oregon. Columbia River (Jr. member, 32R49).

Holtby, R. E., U.S.F.S., Cascade Locks, Oregon. Columbia River (Jr. member, 40R46).

Gulf States Section

Junior Grade

Lemaire, R. J., Grad. Student, La. State, Baton Rouge, La.; La. State, B.S.F., 1950. A. B. Crow, C. O. Minor, R. W. Hayes.

Woody, A. D., Forester, Raywood Co., Jackson, Miss.; Univ. of Ga., B.S.F., 1949. R. M. Conarro, D. J. Weddell, G. N. Bishop.

Inland Empire Section

Junior Grade

Landenberger, C. F., Personnel Asst., Potlatch Forests, Inc., Lewiston, Idaho; Colo. A & M., B.S., 1948; M.F., 1949. J. L. Deen, W. Schaeffer, J. V. K. Wagar.

Member Grade

Erickson, H. J., 1620 Sherman, Coeur d'Alene, Idaho. Inland Empire (Jr. member, 1942).

Intermountain Section

Junior Grade

Forister, T. E., Asst. Cashier, State Bank of Big Piney, Big Piney, Wyo.; Mont. State, B.S.F., 1949. R. Williams, F. G. Clark, T. C. Spaulding.

Green, E. C., Jr. Range Exam., Prod. and Marketing Adm., Boise, Idaho; Univ. of Idaho, B.S.F., 1949. D. S. Jeffers, E. Wohletz, T. S. Buchanan.

Hong, R. F., Jr., Forester, U.S.F.S., Vernal, Utah; N. Y. State, B.S.F., 1948. J. S. Illick, F. E. Carlson, L. P. Plumley.

Rees, P. M., Dist. Forest Rgr. U.S.F.S., Panguitch, Utah; Idaho State, B.S.F., 1940. J. M. Hockaday, O. Julander, B. H. Tucker.

Member Grade

Burma, G. D., Carson Agency, Stewart, Nev. Intermountain (Jr. member, 1940).

Grossenbach, P. A., U.S.F.S., Ogden, Utah. Intermountain (Jr. member, 1938).

Zaueke, W. F., Jr., 225 S. Fourth E., Salt Lake City, Utah. Intermountain (Jr. member, 1942).

Kentucky-Tennessee Section

Junior Grade

Zarger, T. G., Staff Forester, Div. of Forestry Relations, Norris, Tenn.; Pa. State, B.S.F., 1949. W. H. Cummings, L. V. Kline, J. O. Artman.

New England Section

Junior Grade

Elias, A. J., 31 Summer St., Claremont, N. H.; Univ. of Me., B.S.F., 1950. G. Baker, F. K. Beyer, R. I. Ashman.

Follett, G. L., 1 Summer St., Adams, Mass.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Jones, T. W., Pathologist, U.S.D.A., New Haven, Conn.; Univ. of Md., B.S., (Hort.), 1947; Yale, M.F., 1949. H. H. Chapman, E. V. Zumwalt, H. J. Lutz.

Madden, R. C., Adm. Asst., Hillingsworth & Whitney Co., Boston, Mass.; Trinity College, B.S., (History), 1940; Harvard Forest, M.F., 1949. New England.

Marsden, I. G., 16 Grove St., Bangor, Me.; Univ. of Me., B.S.F., 1950. K. K. Beyer, G. Baker, R. I. Ashman.

Masse, K. D., Foreman, H. C. Masse Co., E. Vassalboro, Me.; Univ. of Me., B.S.F., 1950. F. K. Beyer, R. I. Ashman, A. G. Randall.

Norcott, K. S., Lincoln, N H.; N. Y. State, B.S.F., 1950. R. G. Unger, L. P. Plumley, F. E. Carlson.

Pusvaskis, P. D., Grad. Student, Yale Forestry School, New Haven, Conn.; Colo. A & M., B.S.F., 1949, J. L. Deen, W. Schaeffer, J. V. K. Wagar.

Stanley, C. T., Jr., Grad. Student, Yale Forestry School, New Haven, Conn.; W. Va., B.S.F., 1949. H. H. Chapman, F. E. Dickinson, G. A. Garratt.

Wagoner, H. E., Instr. of Ento., Univ. of Me., Orono, Me.; Univ. of Me., B.S.F., 1950. R. I. Ashman, F. K. Beyer, G. L. Chapman.

Weeks, W. C., 58 Park Street, Orono, Me.; Univ. of Me., B.S.F., 1950. G. L. Chapman, F. K. Beyer, R. I. Ashman.

Young, K. E., Asst. Mgr., S. Portland Plan Mill, Inc., South Portland, Me.; Univ. of Me., B.S.F., 1943. R. I. Ashman, A. G. Randall, F. K. Beyer.

Associate Grade

Barraclough, Solon L., Dr., Forest Economist, Harvard Univ., Cambridge, Mass.; Univ. of N. H., B.S., (Economics), 1941; Harvard Forest, M.A., Ph.D., (Agric., & Forestry), 1950. New England.

New York Section

Junior Grade

Dudley, B. L., 57 State St., Skaneateles, N. Y.; N. Y. State, B.S.F., 1950. L. P. Plumley, R. G. Unger, F. E. Carlson.

Johns, H. R., Jr., 164 35th Ave., Flushing, N. Y.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Roberts, F. J., 120 Century Drive, Syracuse, N. Y.; Purdue, B.S.F., 1950. A. M. Herrick, C. S. Miller, B. N. Prentice.

Northern California Section

Junior Grade

Norman, K. P., Grad. Student, Univ. of Calif., Berkeley, Calif.; Univ. of Calif., B.S.F., 1950. F. S. Baker, A. W. Sampson, R. N. Colwell.

Simpson, C. M., Timekeeper, Fruit Growers Supply Co., Westwood, Calif.; Mont. State, B.S.F., 1949. R. Williams, F. G. Clark, T. C. Spaulding.

Wagle, R. F., Sr. Lab. Asst., Univ. of Calif., Berkeley, Calif.; Univ. of Minn., B.S.F., 1940. Reinstatement.

Member Grade

Baer, H., Crannell, Calif. Northern California (Jr. member, 1944).

Beattie, B., U.S.F.S., Northfork, Calif. Northern California (Jr. member, 36R45).

Grundman, R., 833 Perkins Way, Fort Bragg, Calif. Northern California (Jr. member, 1944).

MacDougall, R. T., Jr., Box 304, Camino, Calif. Northern California (Jr. member, 1944).

Mehlert, C., Mt. Diablo State Park, Diablo, Calif. Northern California (Jr. member, 1943).

Morris, E. F., U.S.F.S., Canby, Calif. Northern California (Jr. member, 1944).

Nelson, R. E., Calif. Forest and Range Exp. Sta., Berkeley, Calif. Northern California (Jr. member, 1944).

Peterson, W. L., Box 547, Chester, Calif. Northern California (Jr. member, 1944).

Sindel, G. E., U.S.F.S., Foresthill, Calif. Northern California (Jr. member, 1936).

Stephens, R. V., West Point, Calif. Northern California (Jr. member, 1944).

Stone, E. C., School of Forestry, Univ. of Calif., Berkeley, Calif. Northern California (Jr. member, 1944).

Tryner, J. P., Patrick's Point State Park, Trinidad, Calif. Northern California (Jr. member, 1944).

Northern Rocky Mountain Section

Junior Grade

Cech, F. C., Asst. Nurseryman, Mont. State Univ., Missoula, Mont.; Mont. State, B.S.F., 1949. P. E. Bruns, T. C. Spaulding, T. A. Walbridge, Jr.

Day, E. V., Forester, U. S. Indian Service, Billings, Mont.; Utah State, B.S.F., 1937. Reinstatement.

Forsyth, H., 39 Carbon Ct., Missoula, Mont.; Mont. State, B.S.F., 1950. F. G. Clark, R. Williams, K. E. Moore.

Griffith, R. D., Forester, J. Neils Lbr. Co., Libby, Mont.; Mont. State, B.S.F., 1939; Yale, M.F., 1940. Reinstatement.

Hatch, W. A., Forester, U.S.F.S., Libby, Mont.; Univ. of Wash., B.S.F., 1940. H. E. Ahlskog, E. M. Welton, T. H. Trosper.

Hunter, H. C. A., Rgr., U.S.F.S., Libby, Mont.; Mont. State, B.S.F., 1949. H. E. Ahlskog, E. M. Welton, T. H. Trosper.

Joslyn, G. E., Rgr. Cons., Bur. of Land Mgmt., Billings, Mont.; Univ. of Idaho, B.S.F., 1949. D. S. Jeffers, E. Wohletz, T. S. Buchanan.

Lyman, J. R., Rgr., Kootenai Natl. Forest, Libby, Mont.; Mont. State, B.S.F., 1949. H. E. Ahlskog, E. M. Welton, T. H. Trosper.

Stevens, T., Cruising & Engr., J. Neils Lbr. Co., Libby, Mont.; Colo. A & M., B.S.F., 1949. J. L. Deen, W. Schaeffer, J. V. K. Wagar.

Terwilliger, C., Jr., Terwilliger Hardware, Encampment, Wyo.; Colo. A & M., B.S.F., 1941; M.F., 1947. J. L. Deen, W. Schaeffer, J. V. K. Wagar.

Ozark Section

Junior Grade

Logan, J. F., Farm Forester, Okla. Div. of Forestry, Oklahoma City, Okla.; Colo. A & M., B.S.F., 1948; M.F., 1949. J. L. Deen, W. Schaeffer, J. V. K. Wagar.

Margrave, F. N., Jr., Unit Forester, Brown Paper Mill Co., Inc., Monroe, La.; La. State, B.S.F., 1948. R. W. Hayes, R. F. West, B. A. Bateman.

McCombs, R. N., Farm Forester, Mo. Cons. Comm., Jefferson City, Mo.; Mich. State, B.S.F., 1949. P. A. Herbert, K. Dressel, P. W. Robbins.

Rasmussen, R. M., Asst. Dist. Forester, Mo. Cons. Comm., Ellington, Mo.; Mich. State, B.S.F., 1949. P. A. Herbert, K. Dressel, P. W. Robbins.

Taley, J. R., Fire Control Asst., Ark. Div. of Forestry, Little Rock, Ark.; Iowa State, B.S.F., 1949. L. M. Anderson, W. A. Faucheux, R. M. Henry.

Affiliate Grade

Coffman, R. B., Tech. Asst., Crossett Lbr. Co., Crossett, Ark. Ozark.

Puget Sound Section

Junior Grade

Eskenazi, J., 3039 Alki Ave., Seattle, Wash.; Univ. of Wash., B.S.F., 1949. J. C. H. Robertson, K. MacDonald, G. Stenzel.

Southeastern Section

Junior Grade

Barber, T. F., Jr., County Rgr., Ga. Forestry Comm., Box 520, Albany, Ga.; Univ. of Ga., B.S.F., 1949. G. N. Bishop, A. E. Patterson, B. F. Grant.

Bremer, R. H., T.V. No. 2 A.A.B., Gainesville, Fla.; Univ. of Fla., B.S.F., 1950. E. A. Ziegler, P. W. Frazer, R. B. Smith.

Brewster, P. H., Jr., Box 809, Cedartown, Ga.; Utah State, B.S.F., 1949. J. W. Floyd, L. M. Turner, T. W. Daniel.

Gregory, A. H., Forester, Gair Woodlands Corp., Savannah, Ga.; W. Va., B.S.F., 1950. A. W. Goodspeed, W. C. Percival, G. G. Marra.

Hankinson, T. B., County Forest Rgr., Ga. Forestry Comm., Atlanta, Ga.; Univ. of Ga., B.S.F., 1949. D. J. Weddell, G. N. Bishop, B. F. Grant.

Horney, H. E., Tbr. Marker, Macon Kraft Co., Macon, Ga.; Mich. State, B.S.F., 1949. H. B. Mathias, N. R. Harding, F. E. Stabler.

Lopardo, F. A., 1909 W. Tison, Gainesville, Fla.; Univ. of Fla., B.S.F., 1950. E. A. Ziegler, J. E. Dickinson, C. G. Geltz.

Mobley, H. E., Jr., 2404 Morgan St., Tampa, Fla.; Univ. of Fla., B.S.F., 1950. P. W. Frazer, H. S. Newins, T. G. Herndon.

Mustian, A. P., Jr., Forester, U.S.F.S., Talledega, Ala.; N. C. State, B.S.F., 1949. H. J. Pawek, B. F. Seizert, H. E. Christen.

Noneman, R. L., Jr. Refuge Mgr., St. Marks Wildlife Refuge, St. Marks, Fla.; N. C. State, B.S.F., 1949. C. M. Kaufman, J. V. Hofmann, R. J. Preston.

Sneckaker, R. A., 2911 N. Boulevard, Tampa, Fla.; Univ. of Fla., B.S.F., 1950. C. G. Geltz, H. S. Newins, P. W. Frazer.

Stevens, W. L., Forester, U.S.F.S., Atlanta, Ga.; Univ. of Me., B.S.F., 1920; Harvard Forest, M.F., 1922. Reinstatement.

Affiliate Grade

Maige, H. R., Forester, St. Joe Paper Co., Port St. Joe, Fla. Southeastern.

Southern California Section

Junior Grade

Schenk, J. A., 2300 S. Westgate Ave., W. Los Angeles, Calif.; Univ of Mich., B.S.F., 1950. K. P. Davis, D. V. Baxter, L. J. Young.

Southwestern Section

Junior Grade

Fletcher, H. C., Forest Influences, S.W. Forest & Range Exp. Sta., Tucson, Ariz.; Utah State, B.S., (Forestry & Geology), 1933. J. A. Egan, K. O. Wilson, P. A. Buss.

Hermes, H. G., Engr. Aide, U.S.F.S., Albuquerque, N. Mex.; Mont. State, B.S.F., 1949. R. Williams, C. W. Waters, F. G. Clark.

Paulsen, H. A., Jr., Rge. Cons., S.W. Forest & Range Exp. Sta., Tucson, Ariz.; Iowa State, B.S.F., 1948. R. H. Canfield, G. S. Meagher, F. R. Herman.

Upper Mississippi Valley Section

Junior Grade

Duvall, T. C., Mgr., Wood Conversion Co., Cloquet, Minn.; Univ. of Minn., B.S.F., 1933. H. S. Olson, R. K. Nelson, W. M. MacConnachie, Jr.

Grubo, A. G., 4254 24th Ave. S., Minneapolis, Minn.; Univ. of Minn., B.S.F., 1950. R. M. Brown, A. E. Schneider, Y. Weinstein.

Hallgren, A. R., Grad. Student, Yale School of Forestry, New Haven, Conn.; Univ. of Minn., B.S.F., 1949. H. H. Chapman, W. H. Meyer, F. E. Dickinson.

Ingham, M. B., Jr., 5336 Humboldt Ave., Mpls., Minn.; Univ. of Minn., B.S.F., 1949. Y. Weinstein, F. H. Kaufert, R. M. Brown.

Lampe, H. C., Research Asst., Univ. of Minn., St. Paul, Minn.; Univ. of Minn., B.S.F., 1949. R. M. Brown, D. P. Duncan, H. L. Hansen.

Nygaard, H. K., 5309 Upton Ave. W., Mpls., Minn.; Univ. of Minn., B.S.F., 1950. R. M. Brown, J. H. Allison, D. P. Duncan

Ralston, R. A., Research Forester, Lake States For. Exp. Sta., St. Paul, Minn.; Colo. A. & M., B.S.F., 1948; Univ. of Mich. M.F., 1949. Z. A. Zasada, E. I. Roe, L. P. Neff.

Wisconsin-Upper Michigan Section

Junior Grade

Burke, R. E., Eland, Wisconsin; Univ. of Minn., B.S.F., 1949. R. M. Brown, D. P. Duncan, J. H. Allison.

Nagel, D. E., 734 N. 34th St., Milwaukee, Wis.; Utah State, B.S.F., 1950. R. R. Moore, J. W. Floyd, T. W. Daniel.

Redding, R. L., Forester, Rgr. Sta., Black River Falls, Wisc.; Univ. of Mich., B.S.F., 1949. S. G. DeBoer, C. J. Wandrey, E. E. Parfitt.

Smith, B. J., Div. Forester, Abitibi Power & Paper Co., Ltd., Sault Ste. Marie, Ontario, Can.; Univ. of Toronto, B.S., (Forestry), 1935. Wisconsin-Upper Michigan.

Member Grade

Whittier, D. B., Cruising, Mapping, Cleveland Cliffs Iron Co., Negaunee, Mich.; Univ. of Mich., B.S.F., 1938. Wisconsin-Upper Michigan (Jr. member, 1938).

Candidates Elected

The following persons were elected to the indicated grades of membership by the Council on February 15, 1950.

Junior Grade

Armstrong, F. H.	Haskell, T. J.
Boyce, S. G.	Hundt, J. R.
Brandau, W. H.	Jackson, W. H.
Chamard, R. R.	Kansky, G. W.
Coleman, G. A.	Kirchner, W.
Cooper, J. W.	Loomis, R. M.
Flower, J. E.	Moon, G. C.
Gayle, J. A.	Mullen, A. H.
Gee, M. A.	Preston, R. J.
Grover, J. D.	Smith, J. E.
Guthrie, J. D.	Sowinski, E. S.
Hansen, G. M.	Wilson, H. E.

Member Grade

Burns, P. Y.	Kirkpatrick, J. C.

Affiliate Grade

Freeman, E. M.	Loper, E. E.
Kennedy, D. P.	Trotter, E. E.

Associate Grade

Fraser, D. A.	Kruskekoff, H. H.

The following persons were elected to the indicated grades of membership by the Council on March 15, 1950.

Junior Grade

Auble, R. G.	McDonald, C. R.
Barnes, W. W.	Morey, G. W.
Boehme, K. R.	Morgan, R. A.
Butcher, G. L.	Niles, J. R.
Cothren, V. W.	Oettinger, F. W.
Ehm, R. E.	Oilschlager, E. E.
Ennis, J. J.	Ordel, A. W.
Eubanks, W. B.	Perkins, E. G.
Faris, E. T.	Prentice, D. C.
Fromme, J. T.	Rawls, M. G.
Greene, M. F.	Rea, R. E.
Haitsch, L. J.	Reinke, M. E.
Henshaw, J. F.	Sheppard, M. H.
Jamerson, L. W.	Shipman, R. D.
Long, S. H.	Smith, D. M.
Longsworth, T. W.	Smith, J. L.
Lonsinger, W. F.	Steimer, J. T.
Marlow, C. W.	Thorpe, L. M.
Meines, M. K.	Wing, G. E.
Miller, J. A.	Zimmerman, J. B.

Member Grade

Dodd, J. B.	Willsie, R. L.
Wilson, H. A.	

Affiliate Grade

Sample, J. L.	Suttle, J. R.

Associate Grade

Johnson, W. S.	Zimmerman, F. R.
Leopold, A. S.	

New Members And Advancements

The new members and members advanced in grade who are listed below are eligible for participation in activities of the Society of American Foresters, including the meetings and projects of Sections, Chapters, Divisions, and Committees. They have submitted their applications for membership, properly endorsed, and have been declared eligible by the Council. By accepting this recognition, these members have indicated their desire to assist the Society in the fulfillment of its objectives.

Allegheny Section

Junior Grade

Anderson, W. C., 402 Parkway, Erie, Pa.

Bell, J. F. L., 202 N. Lee St., Lewisburg, W. Va.

Pellinger, J. J., 668 Linden Ave., Rahway, N. J.

Wade, I. W., P.O. Box 469, Wellsburg, W. Va.

Member Grade

Ludwig, W. D., Jr., 627 Phila. Ave., Chambersburg, Pa.

Vogler, A. H., 209 State St., Russell, Pa.

Appalachian Section

Junior Grade

Boswell, A. W., Laurel Hill, N. C.

Davis, T. S., New Hope Rd., Gastonia, N. C.

Fuller, R. R., Rt. 2, Lewisburg, N. C.

Griffin, F. S., Jr., Robbinsville, N. C.

Hewlett, J. D., R.F.D. #2, Edinburg, Va.

Marshburn, W. J., Jr., P.O. Box 664, Rockingham, N. C.

Martz, R. C., Jr., 1002 Nelson St., Richmond, Va.

Pekar, M. A., Timmerman House, Saluda, S. C.

Rogers, G. L., 302 First Ave., Farmville, Va.

Ward, J. R., Lake Waccamaw, N. C.

Wilson, A. D., 310 Bridge St., Farmville, Va.

Central Rocky Mountain Section

Member Grade

Hughes, H. R., Box 91, Collbran, Colo.

Central States Section

Junior Grade

Grover, J. D., 2127 Forest Ave., Lansing, Mich.

Gunderson, W. R., 110 W. Washington, Howell, Mich.

Kent, B. F., 915 Lincoln St., Charleston, Ill.

Killmar, K. D., Dept. of Cons., State Office Bldg., Lansing, Mich.

Link, J. E., 104 S. Jackson, Waukegan, Ill.

Packman, R. S., 605 Napoleon St., Valparaiso, Ind.

Reinhardt, W. H., 204 S. National St., Howell, Mich.

Richards, D. L., 1006 Western Ave., Joliet, Ill.

Affiliate Grade

Kern, L. E., c/o Martin State Forest, Shoals, Ind.

Trotter, E. E., P.O. Box 68, Jasper, Ind.

Columbia River Section

Junior Grade

Carnegie, J. A., 903 W. 11th St., Medford, Ore.

Grosh, E. R., 291 W. Clay St., Monmouth, Ore.

Junglaecker, J. P., Gen. Delivery, Westfir, Ore.

Loomis, R. M., 100 Powell, Prineville, Ore.

McDonell, N. R., 147 N. Jackson St., Roseburg, Ore.

Nicholson, R. L., Box 481, Vancouver, Wash.

Worstell, R. L., U.S.F.S., Foster, Ore.

Wright, K. H., 2817 S.E. Fransic St., Portland, Ore.

Wylie, C. W., 190 E. Owens St., Salem, Ore.

Gulf States Section

Junior Grade

Burns, E. B., Box 11, Mandeville, La.

Dixon, M. J., 999 Center St., Winnfield, La.

Marshall, T. W., Mansfield Hardwood Lbr. Co., Zwolle, La.

Robertson, R. R., State College, Starkville, Miss.

Rodrique, E. A., Ellisville Bldg., Laurel, Miss.

Inland Empire Section

Junior Grade

Barrett, S., 915 Lake St., Sandpoint, Ida.

Burlison, V. H., Asst. Ext. Forester, Univ. of Idaho, Moscow.

Intermountain Section

Junior Grade

Braithwaite, E. G., 297 N. Main St., Payson, Utah.

Colton, G. M., R.F.D. #1, Vernal, Utah.
Fluckiger, D. T., Gen. Delivery, Kemmerer, Wyo.
Frisby, W. E., P.O. Box 134, Payson, Utah.
Fry, G. B., c/o O. B. Fry, Ft. Duchesne, Utah.
Koch, C. B., Challis, Ida.
Palmer, A. N., 3703 Kootenai Ave., Boise, Ida.
Sandretto, R. P., St. Anthony, Ida.

Member Grade

Lafferty, G. E., Clayton Rgr. Sta., Clayton, Ida.

Kentucky Tennessee Section

Junior Grade

Brandau, W. H., U.S.F.S., Morehead, Ky.
Cockroft, W. S., 1034 S. Wellington, Memphis, Tenn.

New England Section

Junior Grade

Burgess, R. F., 36 College Ave., Orono, Me.
Church, C. J., 52 Monroe St., Amesbury, Mass.
McNally, J. A., 1407 Oak Ave., Quebec, Canada.
Nelson, C. L., Greenville, Me.
Nicholson, J. D., 43 Main St., Orono, Me.
Pekar, M. A., Bridgeport, Conn.
Whipple, P. C., 79 Larchwood Drive, Cambridge, Mass.

Affiliate Grade

Dubrueil, R. F., P.O. Box 303, Canaan, Conn.
Jacobs, P., 213 High St., Berlin, N. H.

Associate Grade

Hosmer, W. A., 182 Washington St., Belmont, Mass.
Potts, S. F., 335 Prospect St., New Haven, Conn.

New York Section

Junior Grade

Berger, J. W., 820 Suburban Place, Bronx 60, N. Y.
Bielejec, J. H., 129 Furance St., Little Falls, N. Y.
Brown, O. W., 126 Schuler St., Boonville, N. Y.
Castellani, 1656 E. 9th St., Brooklyn 23, N. Y.
Heinemann, G. L., 59 Croydon Rd., Rochester, N. Y.
MacAlpine, W. W., 112 Wiley St., Ticonderoga, N. Y.
McLean, H. J., 317 State Tower Bldg., Syracuse, N. Y.
Mueser, A. W., Clinton Corners, Dutchess County, N. Y.
Shone, R. T., 42 Day Place, Rochester, N. Y.

Member Grade

MacLulich, D. A., 15 Bellwood Ave., Ottawa, Canada.
Matthews, C. M., 3 Tolly St., Univ. Trailer Camp, Syracuse, N. Y.

Associate Grade

Fraser, D. A., Forest Insect Lab., Sault Ste. Marie, Canada.

Northern California Section

Junior Grade

Conrow, T. M., U.S.F.S., Canby, Calif.
Hanson, R. C., 27 Garcia Ave., San Francisco, Calif.
Kirchner, W., U.S.F.S., Challenge, Calif.
Millar, R. R., U.S.F.S. Challenge, Calif.
Nordyke, J. P., 744 Keeler Ave., Berkeley, Calif.

Member Grade

Fowler, C. W., 2288 Fulton St., Berkeley, Calif.

Affiliate Grade

Holmes, O. L., 1348 Market St., Redding, Calif.

Northern Rocky Mountain Section

Junior Grade

Faurot, J., Mont. State Univ., Missoula, Mont.
Saltsman, J., 758 Eddy Ave., Missoula, Mont.

Member Grade

Neitzling, F. J., Forest Supv., Kalispell, Mont.

Ozark Section

Junior Grade

Elwert, E. P., Cominto, Ark.
Griffin, B. F., Pomeroy & McGowin, Monticello, Ark.
Maddox, J. W., P. O. Box 632, Eminence, Mo.
McDonald, D. R., Hamburg, Ark.
Zurney, W. E., 410 N. 5th St., Poplar Bluff, Mo.

Member Grade

Anderson, C. G., U.S.F.S., Willow Springs, Mo.
Burns, P. Y., Dept. of Forestry, Univ. of Mo., Columbia, Mo.

Puget Sound Section

Junior Grade

Maki, A. T., P. O. Box 740, Chehalis, Wash.
Melrose, R. M., 309 N. Kay St., Tacoma, Wash.
Mouser, W. E., Indian Agency, Nespelem, Wash.

Member Grade

Corson, K. P., Land Mgmt., Issaquah, Wash.
Covington, D. M., Box 23, La Grande, Wash.
Moisio, W. J., U.S.F.S., Marblemount, Wash.
Neumen, F. W., P.O. Box 253, Weyerhaeuser Thr. Co., Chehalis, Wash.
Peter, R. K., Snider Rgr. Sta., Port Angeles, Wash.
Soderlind, D. R., Rt. 2, Box 615, Bellevue, Wash.
Tulloch, C. E., Rt. 7, Box 70, Tacoma, Wash.

Southeastern Section

Junior Grade

Attaway, H. B., Univ. of Fla., Gainesville, Fla.
Barnes, C. S., 116 W. Church St., Americus, Ga.
Binns, W. A., Henry Binns Hotel, Albany, Ga.
Bumgarner, H., Box 86, Olustee, Fla.
Chapman, W. L., Rt. 1, Sale City, Fla.
Cloud, M. C., Jr., Univ. of Ga., Athens, Ga.
Darby, S. P., Jr., Box 507, Univ. of Ga., Athens, Ga.
Gandy, J. A., 1211 Mimosa Drive, Macon, Ga.
Gaffney, M. T., Box 6, Polk City, Fla.
Greer, E. S., Jr., 1737 S. Gordon St., Atlanta, Ga.
Griffin, E. C., 411 Williams St., Tallahassee, Fla.
Hamilton, J. R., Ga. Agric. Exp. Sta., Experiment, Ga.
Hanson, J. W., 1379 Ga. Ave., Macon, Ga.
Miller, J. E., Brown Marx. Bldg., Birmingham, Ala.
Moore, J. B., Dover Hall, Brunswick, Ga.
Nelson, R. B., 420 Howell St., Thomaston, Ga.
Powers, L. M., 705 E. Duval St., Lake City, Fla.
Simmons, H. W., Adel, Ga.
Starke, H. B., U.S.F.S., Wilma, Fla.
Stokes, R. A., Minneola, Fla.

Member Grade

Rowland, C. A., Jr., 430 Milledge Terrace, Athens, Ga.
Smith, R. B., 515 Briarcliff Drive, Gainesville, Fla.
Stubler, F. E., 3120 Brookwood Drive, Macon, Ga.
Vousden, J. A., c/o Koppel Hotel, Homerville, Ga.

Southwestern Section

Junior Grade

Carey, R. E., Box 1490, Flagstaff, Ariz.
Clark, D. W., P. O. Box 15, Chinle, Ariz.
Hawksworth, F., 223 N. 9th St., Albuquerque, N. Mex.
Hickman, R. D., P. O. Box 161, Peach Springs, Ariz.
Schuft, P. H., Grand Canyon Natl. Park, Grand Canyon, Ariz.

Member Grade

Weil, E. H., Jr., U.S.F.S., Springerville, Ariz.

Upper Mississippi Valley Section

Junior Grade

Johnson, A. R., c/o Iron Range Res. & Rehab., Hibbing, Minn.
Whipple, E. L., 1922 College St., Fargo, N. Dak.

Washington, D. C. Section

Junior Grade

Armstrong, F. H., Capt., U. S. Army Engr. Corps, Ft. Belvoir, Va.
Bean, L. S., 1510 N. Frederich St., Arlington, Va.
Patterson, D. H., 2035 N. Vermont St., Arlington, Va.
Tribbett, V. A., Room 5545, Interior Bldg., Washington, D.C.

Wisconsin Upper Michigan Section

Junior Grade

Decker, T. P., Whitehall, Wis.
DeVriend, A., Wis. Cons. Dept., Campbellsport, Wis.
Faber, E. J., Rgr. Sta., Mercer, Wis.
Hallberg, J. E., 1623 20th St., Two River, Wis.
Underwood, N. B., Campbellsport, Wis.
Upton, N. W., Park Falls, Wis.

Foreign

Junior Grade

Gruenfeld, J. J., Exeter College, Oxford, England.

Corresponding Grade

Juncker, F. G., Overgaard Havndal, Denmark.

Foresty News

Maine Pulp and Paper Companies Establish Experimental Forest

Nine pulp and paper companies with timberland holdings in Maine have established a 5,800 acre experimental forest near Bangor.

The land will be leased to the U. S. Forest Service for a 99-year period. Under terms of the agreement the Northeastern Forest Experiment Station, through its research center in Bangor, will administer the tract and have responsibility for all experimental work. The project will be known as the Penobscot Experimental Forest.

This is believed to be the first instance in the annals of American forestry in which a group of wood-using industries have united to purchase a large tract of timberland solely for lease to the federal government for experimental work on a cooperative basis.

Cooperating companies include: Great Northern Paper Co., Hollingsworth and Whitney Co., Oxford Paper Co., Eastern Corporation, S. D. Warren Co., Penobscot Chemical Fibre Co. through its subsidiary Penobscot Development Co., International Paper Co., St. Regis Paper Co., and the Dead River Co.

The University of Maine, the Extension Service, the Maine Agricultural Experiment Station, and various other agencies will be asked to cooperate in the project.

Malayan Forester Inspects U.S. Timber Industry and Research

C. O. Flemmich of the forestry department at Singapore, Malaya, recently visited Memphis, Tenn., to observe the National Hardwood Lumber Association's hardwood inspection school and to study the Nickey Brothers, Inc. plywood plant. Earlier, he had visited the Forest Products Laboratory at Madison Wis. A forestry graduate of Oxford, Flemmich has been in Malaya for the past 19 years. He stated that most of the Malayan lumber exports are now going to England and other parts of the United Kingdom. Until recently large exports were going to Hongkong and Shanghai. Flemmich indicated that the woods of Malaya are very similar to those found in the Philippine Islands.

States Get $7,719,000 From National Forest Receipts

Checks totaling $7,719,301, or approximately 25 percent of the national forest receipts for the 1949 fiscal year, have been sent to states containing national forest land. The Forest Service says this represents the greatest return ever made to the states from national forests, surpassing last year's record payment of about $6,000,000.

Forty states, Alaska, and Puerto Rico received amounts varying from $38 for North Dakota to $2,044,693.81 for Oregon. States share in national forest receipts in proportion to the amount collected from national forests within their boundaries. The law provides that the money is to be expended as state legislatures prescribe for the benefit of public schools and roads within the counties in which national forest land is situated.

Annual Meeting, Southern Pulpwood Conservation Assoc.

The anual meeting of the Southern Pulpwood Conservation Association was held in the Atlanta Biltmore Hotel, Atlanta, Ga., February 15, with a total attendance of nearly three hundred.

E. J. Gayner, 3rd, president of the association, presided. Henry J. Malsberger, general manager, reported on association activities during the past year.

Among the speakers were W. K. Beichler, state forester of North Carolina; William A. Duerr of the Southern Forest Experiment Station; and William J. Barker, extension forester of South Carolina.

A panel discussion on conservation featured R. W. Wortham, Jr. of Southland Paper Mills, Inc.; Albert Ernest of St. Regis Paper Company; J. E. McCaffrey of West Virginia Pulp and Paper Company; and K. S. Trowbridge of North Carolina Pulp Company.

At the association's annual dinner J. Herbert Stone, regional forester, U. S. Forest Service, Atlanta, gave an illustrated talk on European forestry.

R. W. Wortham, Jr., Southland Paper Mills, Inc., was elected president for the current year.

E. G. Cheyney (1878 - 1950)[1]

Professor Emeritus "Bill" Cheyney, 71, who retired in 1947, after 42 years service in the School of Forestry, University of Minnesota, died on January 21 at the University of Minnesota Hospitals of an internal hemorrhage caused by a malignant tumor. While he had not been feeling quite as well as usual for several months the seriousness of his condition was not recognized until early in January while he and Mrs. Cheyney were visiting with their daughter living at Atlanta, Ga.

Cheyney was born in Washington, D.C., received his secondary education in that city, graduated with the A.B. degree from Cornell in 1900 and came to the University of Minnesota in the fall of 1905 as assistant in forestry, after a year at the Yale School of Forestry and two years as student assistant with the U. S. Bureau of Forestry, now the U. S. Forest Service. In 1907 he was promoted to assistant professor and in 1911 to professor and chief of the University Division of Forestry. In 1925 he retired as chief of the division to concentrate on teaching, writing and research. At one time or another he taught almost every subject in the forestry curriculum at Minnesota, but after 1927 he concentrated on silvics and silviculture.

He was the author of many articles and of a number of bulletins on forestry subjects. In addition he was the author of *American Silvics and Silviculture*, *What Tree is That*, and with T. Shantz-Hansen, *This is our Land*. He also was the author of the *Scott Burton* series of books for boys.

[1] See "WE PRESENT Edward G. Cheyney", J. of For., Vol. 46 (1948) pp. 692-693.

Muskingum Tree Planter to Be Produced Commercially

A mechanical tree planter developed by the Muskingum Conservancy District in Ohio may soon be produced by the Oliver Tractor Company. The machine has been operated successfully in many types of soils and on slopes in excess of 50 percent. It was developed especially to meet the conditions of watershed planting in the Muskingum area and has had several years' successful trial.

Ohio Forestry Association Elects Officers for 1950

Horatio Ford, Cleveland lawyer and banker, was elected president of the Ohio Forestry Association at its annual meeting January 13 and 14. He succeeds Theodore Reed, banker, of Pomeroy, Ohio. Other officers elected for 1950 are John H. Byrne of Cleveland, first vice president; Howard Wells of Wilkesville, second vice president; Philip Hampton of Columbus, treasurer; and Bryce C. Browning, New Philadelphia, chairman of the executive committee. Dr. Charles E. Holzer of Gallipolis and Dr. Paul B. Sears of Oberlin were elected honorary vice presidents for life.

Montana School of Forestry Adds New Facilities

Federal funds have been made available to the Montana State University, School of Forestry, for the establishment of a wildlife research unit in connection with it curriculum in forestry. The school is also preparing to construct a greenhouse equipped with modern control units, air conditioning, and a dark room.

Georgia Forestry Expansion Sets Record for State Action

During the last six months of 1949, state forestry in Georgia expanded more than in any similar period on record. In fact, the growth of activity since July 1, 1949 has equalled the expansion of the previous ten years.

Counties now having organized fire protection now total 79 with 13.5 million acres, as compared with the July 1, 1949 figures of 41 counties and 8.5 million acres. Schools have been held to train all newly employed rangers in fire suppression and prevention techniques. A total of 84 vehicles have been purchased. Throughout the state 66 steel lookout towers are being erected.

A record total of 40 million seedlings will be shipped to landowners during the current planting season. More requests for assistance to small landowners in forest management problems have been handled than during any previous similar period. Educational and informational work of the Georgia Forestry Commission has been broadened and enlarged.

An inspection tour of north Idaho's timberlands is made annually by the Idaho State Cooperative Board of Forestry, composed of the Governor, Attorney General, Secretary of State, State Auditor, Superintendent of Public Instruction, State Land Commissioner, State Reclamation Commissioner, Dean of the School of Forestry, representatives of all timber protective associations, livestock associations and U. S. Forest Service. Tours are sponsored jointly by the Clearwater and Potlatch timber protective associations. Purpose is to inspect forest management activities embracing fire control, cutting practices, logging methods, slash disposal and blister rust control. Highlight of the tour is a two-day cruise aboard 40-foot rubber floats down 60 miles of the North Fork of the Clearwater River through the heart of the largest remaining stand of virgin white pine in the world. The tours are a significant working example of the cooperative approach to forest management problems in the Inland Empire. Plans are now underway for the 1950 tour. Shown above are members of the Idaho State Cooperative Board of Forestry with Senator Henry Dworshak, representatives of the U. S. Forest Service and Bureau of Entomology and Plant Quarantine, newsmen and other guests prior to embarking on the 1949 tour.

Founder and Publisher of Timberman Dies at 82

George M. Cornwall, founder and publisher of the *Timberman* died on January 31 in Berkeley, California. He was a leading figure in the origin of many of the West's lumber trade and civic organizations.

A native of Scotland, he came to this country as a boy and to the Northwest in 1889, where he became partner in publication of the Cathlamet, Wash. *Gazette* before founding the *Timberman*. Through the lumber trade journal he inspired the organization of the Pacific Logging Congress in 1909 and served as its secretary for 15 years and had been an honorary vice president until his death.

He shared in the development of the Western Woodworking and Planing Mill Association, the Western Forestry and Conservation Association, the Western Retail Lumberman's Association, the Millwork Institute of California, and the Pacific Northwest Woodwork Association. For 17 years he was regent of Oregon State College. Active in developing sound forest legislation for the State of Oregon, he also was instrumental in the creation of the state's workman's compensation act and similar progressive measures.

Wisconsin Halves Fire Losses

Wisconsin's forest fire damage last year on lands under protection by the state conservation department was about half of that suffered in 1948. The 1,164 fires represented a reduction of 36 percent from the 1,825 fires of 1948. The 9,749-acre burn was 59 percent less than the 1948 total of 23,574 acres and the damage dropped from $95,117 in 1948 to $47,704 last year. In 26 counties, largely agricultural, where the department gives cooperative aid in fighting fires, a burn of 19,474 acres was reported with a loss of $118,328.

Test Kit for Water Hardness

A new test kit, packaged in a sturdy, pocket-size plastic box is designed to test the hardness of water in less than two minutes. The test is as easy as telling red from blue and is reported to be accurate to within one grain of hardness per gallon. The kit contains three vials of chemicals and one combination measuring and mixing vial. Enough chemical is included to make more than 50 separate tests, depending on the hardness of the water. Refills are available. Known as the Versene kit, it is manufactured by The Bersworth Chemical Co., Framingham, Massachusetts.

Forest Farmers Hold Southern Forestry Conference

The Southern Forestry Conference of the Forest Farmers Association was held in Jacksonville, Fla., February 17 and 18 at the George Washington Hotel, President William M. Oettmeier of Fargo, Ga., presiding. Among the speakers at the first morning session were Marcel Leloup, director of the F.A.O. Division of Forestry and Forest Products, Washington, D. C.; A. E. Wackerman of the Duke University School of Forestry, Durham, N. C.; and L. K. Pomeroy of Pomeroy & McGowin, Monticello, Ark.

Seven group meetings were held during the afternoon. The subjects considered were planning for southern forestry, forest protection, forestry conservation education, legislation, research, forest insects and diseases, and membership objectives of the association.

At the annual dinner held on the evening of February 17, Stanley F. Horn, editor of the *Southern Lumberman*, served as toastmaster. The featured speaker was Senator Frank P. Graham of North Carolina.

The concluding session was devoted to technical subjects. Among the forestry speakers were I. T. Haig of the Southeastern Forest Experiment Station, R. H. Westveld of the University of Missouri, R. R. Reynolds of the Crossett Experimental Forest, B. E. Allen of Union Bag and Paper Company, and Frederick H. Vogel of Alabama Polytechnic Institute.

All arrangements for the meeting were in charge of Paul W. Schoen, executive secretary of the Forest Farmers Association, Valdosta, Ga.

"Scene in Action" Prevention Materials Again Available

Attractive 16- by 19-inch full color animated forest fire displays are again being made available for the 1950 fire-prevention campaign. The "realism" is produced by a painted design on a plastic cylinder which revolves constantly from the heat of an electric bulb in its center. The light source is designed and the rays are controlled to penetrate another painted design on a diaphram to the rear of the painted picture, giving the appearance of a raging fire. The original idea for the animated display is credited to Hugh D. Bennett, secretary, Keep Minnesota Green Committee. The displays are in use by lumber companies, mills, forest owners and wood processors, conservation agencies and similar organizations. They are available from A. L. Lind Company, Minneapolis, Minn.

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Illinois Foresters Develop Management Practices

A guiding policy for professional forest management of the 4 million timbered acres in Illinois was developed by the Illinois Technical Forestry Association meeting, January 3 to 5. The manual of optimum woodland practices, while tentative, is based on the original work of forest research scientists and practicing professional foresters, both private and public, all of whom are members of the association. The basic forest practices committee, with Donald W. Winters, consulting forester as chairman, is divided into northern and southern groups. The southern group includes Donald W. Winters, Richard D. Lane, Leon S. Minckler, Roy W. Olson, and Harry D. Switzer. The northern group include Lawson B. Culver, W. C. Finley, Nels G. Glesne, Ralph W. Lorenz, Harry S. Treadwell, John C. Van Camp, Jr., and H. F. Siemert.

Past major contributions of the Illinois Technical Forestry Association to economic land management have been the writing of the comprehensive *Plan for Forestry in Illinois* and the development of an accurate timber volume table for Illinois hardwoods in cooperation with the Central States Forest Experiment Station. In 1948 it sponsored a state-wide forestry congress. It also assisted the American Forestry Association and the U. S. Forest Service in separate surveys of Illinois forest resources.

W. R. Boggess, forester, Illinois Agricultural Experiment Station, Robbs, Ill., was elected president of the I. T. F. A. for the ensuing year. Other elective positions filled include Nels G. Glesne of Havana, vice-president; Donald A. Kulp of Urbana, secretary-treasurer; E. E. Nuuttila of Springfield, member of the board of directors. J. Donovan Larson of Springfield was named to direct public relations.

"Brighter Look," New Movie

A new 16 millimeter, sound, color motion picture produced by the American Turpentine Farmers Association of Valdosta, Georgia, promotes the use of turpentine products on the farm. Made and distributed in cooperation with the Georgia Agricultural Experiment Station, it supplements the earlier film, "Suwanee Pine," which deals with turpentine operations. The film takes 25 minutes' running time and can be obtained from M. E. Coleman, secretary of the Association, Valdosta.

Dry Kiln Course, New York State College of Forestry

Intensive practical instruction in dry kiln operation will be provided by a ten-day course, April 18 through April 27 at the New York State College of Forestry, Syracuse, N. Y. It will be the 33d time the short course has been given. Graduates now number more than 450 men.

"Emphasis is on practical information and experience, with simple explanations and clear demonstrations," Dean Joseph S. Illick said. "Efficient use of dry kilns is imperative today for three vital reasons: to get a quality product, to realize costs that are competitive, and to conserve forest resources."

Besides dry kiln operators, records on the course reveal that classes have been made up of shop foremen, factory superintendents, mill engineers, furniture manufacturing and sales executives, and plant owners. Mechanical engineers, architects and designers, and lumber purchasing agents and salesmen have also attended for the value the training has given them in their work.

Tuition is $50, with traveling costs to and from Syracuse and living expenses during the ten-day period borne by students.

Application for enrollment limited to 25 men so that individual direction can be given each man should be made to James M. Owens, extension specialist in forest utilization, State College of Forestry, Syracuse 10, N. Y.

Pulp and Paper Company Aids Local Conservation

West Virginia Pulp and Paper Company has adopted a forestry program in the Charleston, S. C. area to encourage dealer organizations to promote better forestry practices, to demonstrate cutting practices on private lands, to make landowner contacts, and to publicize the benefits of sound forestry programs. Five graduate foresters are engaged in the program.

Texas Has Best Fire Year

The forest fire record for 1949 was the best in the history of the Texas Forest Service.

Only 834 forest fires were reported in the area under protection compared to 3,352 fires in 1948. In 1947, 3,520 forest fires occurred. A net forest area of seven and one-half million acres of valuable commercial timber is protected from forest fires in East Texas. Two and one-half million acres of private forest lands are not receiving any type of organized fire protection.

The forest area burned by fires in 1949, amounted to 18,508 acres, as contrasted with 389,667 acres in 1948.

J. O. Burnside, head, forest fire control department, stated that the favorable weather had played a significant part in the establishment of the excellent fire record, but added that the weatherman cannot be given all of the credit. Very light rainfall was recorded throughout East Texas during November which is frequently a dangerous forest fire month. Arkansas, Louisiana, Mississippi, Florida and some other southern states experienced very critical fire seasons during 1949.

Relocation of fire lookout towers to increase visibility and the increased use of aircraft have been important factors in the quick detection of fires. Increasing use of mechanical equipment has also been a factor in reducing the area loss.

Big Game Take on National Forests Increased in 1949

Approximately 5,000,000 people used national forest lands for hunting, fishing, and trapping during fiscal year 1949. While use by sportsmen and trappers about equals last year's record, reports from U. S. Forest Service field offices show an increase in the big game "take." During the year 1,210,000 hunters bagged 318,000 animals as compared with the 279,000 animals taken by about the same number of people in 1948.

Basing estimates on checking stations in the national forests and other sources, the report shows that 270,000 deer of all kinds were taken from national forest lands. In addition, 37,000 elk, 8,300 bear, and a small number of antelope, moose, mountain goats, bighorn sheep, peccary, and wild boar were harvested. Some 2,960,000 fishermen, 516,000 small game hunters, and 45,000 trappers also used national forest lands. No reports are made as to the number of fish caught, small game taken or fur-bearing animals trapped.

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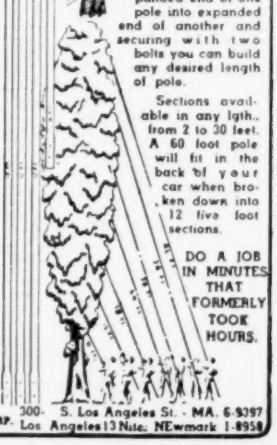
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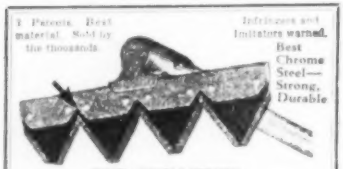
Wetzel Assistant Chief of Grazing, California Region

Walter H. Wetzel succeeds Avon Denham as assistant chief of range management in the California Region of the U. S. Forest Service. Denham recently was promoted to the Washington, D. C., headquarters of the Forest Service.

Wetzel has been with the Forest Service for 22 years, and is a forestry graduate of the Montana State University. Since 1947 he had been assistant chief, division of operation, in the Forest Service regional office in Portland, Oregon. He will serve as assistant to C. A. Joy in handling grazing problems on the 18 national forests in California.



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Wilderness Preservation Study Made by Library of Congress

The Legislative Reference Service, Library of Congress, recently completed a study of the problem of wilderness preservation. In an analysis of opinion on the problem, C. Frank Keyser, regional economist for the library, summarizes the majority opinion, gleaned from public and private agencies and organizations.

"A survey of the public lands of the nation, and some private lands as well, should be made with a view to determining two facts: (1) whether the present dedicated wilderness areas meet all of the qualifications and whether they are too large or too small, and (2) for the purpose of locating additional areas capable of meeting those qualifications. This may be done at the direction of Congress, possibly by a joint resolution or concurrent resolution authorizing the survey.

"A national wilderness policy would probably require national legislation. The policy should have the same status as the national parks policy. It should contain some provisions for state and local government participation, either in the selection of areas or in their administration. Federal assistance may be both financial as well as technical.

"Permissible uses should be spelled out, as well as those which should be prohibited. Among the uses suggested as permissible are camping, hiking, canoeing, horseback and pack-horse travel. Prohibited uses suggested are any means of mechanical travel, especially autos and airplanes. Construction of roads should be barred except for the barest minimum for access to but not through the areas, and only the most simple trails are believed to be desirable in the eyes of most correspondents. All but a very few suggest that all commercial developments such as cabins, lodges, stores, hotels, ski tows and the like be barred. Opinion is divided on permitting hunting and fishing, although a majority would permit them."

West Virginia Gets Two-Way Radio Communication

Working to strengthen its law enforcement machinery, the West Virginia Conservation Commission is having two-way radios installed in the 60 automobiles of its conservation officers. The new equipment will enable the officers, while in the field, to keep in touch with each other and with the chief enforcement officer in the state capitol.

New Trail Riders Chief

Mrs. Dorothy Dixon has been named director of Trail Riders of the Wilderness, an activity of the American Forestry Association. She succeeds A. G. Hall who left the Association in December. Mrs. Dixon, who will direct the popular wilderness expeditions conducted each year since 1933, has long been associated with the program. Preliminary announcement of the 1950 expeditions include wilderness treks into the Great Smoky Mountains of North Carolina and Tennessee, the Flathead-Sun River area of Montana, Quetico-Superior water-wilderness in Minnesota and Ontario, the Sawtooth area of Idaho, the Maroon Bell-Snowmass wilderness of Colorado, the Cascade Crest area of Washington, and the Pecos wilderness area in New Mexico.

MacDonald to Washington Teaching Staff

Kenneth M. McDonald has been appointed to the faculty of the University of Washington, College of Forestry. MacDonald, a graduate of the University (BSF 1932), is to fill the position vacated by Bernard L. Orell, recently named supervisor of forestry for the State of Washington.

Teaching forest fire control work will be the specialty of Macdonald who for the past 2½ years has been woods superintendent and forester for the Sacramento Box and Lumber Company operation at Woodleaf, California. Before this, he had 10 years experience with the U. S. Forest Service. He worked on fire control and land acquisition in the middle west, and on timber valuation and training with the Forest Service at Missoula, Montana.

New Chain Saw

Designed to fit the power takeoff of all tractors and jeeps, the new Von Ruden chain saw fells and bucks extremely fast and cuts four foot logs or small tree limbs with equal ease. It is reported to operate efficiently in a vertical, horizontal, or angular position. The new saw cuts at ground level, handles fallen logs quickly, and swings easily into difficult positions with no belts or pulleys to catch on brush. Logs can be sawed from the top or bottom. The saw is easy to use, the operator merely guiding the chain with the easy-grip handle. The tractor or jeep carries the weight of the saw, eliminating all chain thrust. Weighing only 106 pounds, the Von Ruden saw has an automatic hook up and locks securely in place for safe, fast transporting.

Improved Color Standards For Maple Syrup Developed

Permanent colored-glass standards for use in classifying maple syrup, to replace the caramel-glycerine solutions now used in the application of the U. S. standards for grades for this syrup, have been developed by the Bureau of Agricultural and Industrial Chemistry and the Production and Marketing Administration. The color of the caramel-glycerine solutions is not stable, and their use as color standards has not been entirely satisfactory.

The three color standards for maple syrup, "light amber," "medium amber," and "dark amber," heretofore represented by the caramel-glycerine solutions, have now been reproduced in permanent amber-colored glass.

For use with the glass color standards, a square-type sample bottle for syrup has been adopted. The new bottle is inexpensive, easily available, provides a thick layer of syrup that facilitates precise classification, and provides a sample of uniform thickness not possible with the cylindrical bottle now in use.

A complete description of the new comparator and the procedure in using it are available from the Fruit and Vegetable Branch of PMA, Washington 25, D. C., and the Bureau of Agricultural and Industrial Chemistry, Eastern Regional Research Laboratory, Philadelphia 18, Pa.

Osmotic Wood Preservative

In a new booklet, *Force Down Operating Costs*, methods of application of a wood preserving compound utilizing osmotic pressure is described. Adaptable to brush-on, spray, or dip application, the preservative is reported to be useful for both home and industrial use. The booklet is available from Osmose Wood Preserving Co., Buffalo 12, N. Y.

Green Gold

A new documentary film, "Green Gold," about forests and timber will soon be released in theaters throughout the world. Produced for the United Nations by Svensk Filmindustri, the film emphasizes that the nations of the world must work together to ensure that their forests are perpetuated and used for the general good.

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Graduate Study in Conservation

Yale University in cooperation with the Conservation Foundation is establishing the country's first graduate program of research and instruction in conservation of natural resources.

Courses will begin September 1950. Paul B. Sears, now at Oberlin College, will be in charge of the Yale program with the rank of Professor of Conservation, a newly created post.

The conservation course will be for graduate students only. It will require two years of study and research, and will lead to the degree of Master of Science in Conservation.

The Conservation Foundation, founded in 1948 with headquarters in New York, "to promote conservation of the earth's life-supporting resources," has given its support and cooperation to the Yale program. Fairfield Osborn, president of the foundation, stated that "this should prove a step of extraordinary importance in the development of the conservation movement in our country.

Professor Sears in directing the Yale program will himself teach two graduate courses—General Ecology and the Ecological Basis of Human Society. In addition, students will take many of the regular Yale courses bearing upon conservation. Some of these are plant and animal ecology, geology of soils, oceanography, biogeochemistry, forestry, and microbiology.

A considerable part of the program will be centered upon study and research in the field. The Connecticut River Valley, which has been described as an outstanding example of both good and bad conservation practices, will serve as the outdoor "classroom."

Sears, a native of Bucyrus, Ohio, received his undergraduate training at Ohio Wesleyan University. In 1915 he received his master's degree from the University of Nebraska and his Ph.D. degree from the University of Chicago in 1922.

He started his teaching career as an instructor in botany at Ohio State University in 1915. From 1919 to 1927 he taught botany at the University of Nebraska.

He went to the University of Oklahoma in 1927 and for the next 11 years was a full professor of botany as well as chairman of the department. Since 1938 he has been professor of botany at Oberlin College.

A well-known lecturer and writer on conservation topics, Professor Sears is the author of such books as *Deserts on the March*, *This is Our World*, and *This Useful World*. In addition to his teaching career he has served as an active worker in many conservation programs, and at present is working on a study of the water resources of Mexico. He is chairman of the Natural Resources Council of America.

Red Cedar Association

The Aromatic Red Cedar Association recently held its organization meeting in Chattanooga, Tenn. and adopted standards designed to provide a continuing supply of cedar chests, closet lining, and other products. The standards stress harvesting only those trees having an 8-inch or larger stump diameter. Through integration with other manufacturers, the program will provide for such products as cedar posts and Christmas trees from thinnings and from the tops of trees. A forestry committee composed of A. L. Foster of George C. Brown and Co., Stuart A. Wetzel of Midland Valley Lumber Co., and P. D. Armstrong of Chickamagua Cedar Co. will spearhead the organization. Posters carrying information on correct cutting practices have been distributed to farmers and cedar timber owners in the region covering Arkansas, Alabama, Mississippi, Kentucky, Tennessee, Virginia, and North and South Carolina. Literature is being distributed to inform timber owners of income possibilities from cedar, best soil conditions for growth, correct planting procedures, and sources of seedlings.

Blister Rust Moves South

Within the past two years white pine blister rust has been found as far south as the Great Smokies. In the southern mountains, Ribes occurs mostly above 3,000 feet, and white pine mostly below that elevation. Thus the rust is expected to be less serious here than elsewhere, according to a report by the Southeastern Forest Experiment Station, Asheville, North Carolina.

Miles of Multiflora Roses

Two hundred miles of multiflora rose will be planted on Ohio farms in 1950, according to Dr. Floyd B. Chapman of the Ohio Division of Wildlife. In 1948, 61 miles were planted. It will be used to replace barbed and woven wire and osage-orange fences, providing both fencing for domestic stock and wildlife habitat. In places the multiflora rose will serve also as a windbreak, attaining a height of from 8 to 10 feet. In addition to providing cover, the rose also produces supplementary food for game and song birds.

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Graduate forester, 27, married. One year experience with state Division of Forestry in forest management and fire control. Desires permanent position with forestry-minded company. References and details on request.
Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester with 6 years' experience in Liberia, Korea, and Japan, desires position in foreign forest production. Has B.S. and M.S. from Michigan State College and currently enrolled in special studies at the University of Michigan. Detailed information and references on request.
Box B, Journal of Forestry, Mills Building, Washington 6, D. C.

Federal Forestry Legislation

House Bill 2419 introduced in the first session by Representatives Tackett and Boyd of Arkansas, proposes that 10 percent of the national forest receipts be spent for recreational purposes in the national forests from which received. The bill has been reported favorably by the House Committee on Agriculture, but has been passed over several times on calendar calls this session.

Senator Murray and Representative Mansfield of Montana have introduced S.3175 and H.R.7257 to provide for acquisition of land and construction of buildings at or near Missoula, Mont., for essential forest fire control operations of the U. S. Forest Service. They propose an authorization of $1,600,000. Purpose is to provide headquarters for smoke jumpers, air cargo supply base and storage facilities.

Hearings have been held before a sub-committee of the House Agriculture Committee on H.R.7155, introduced by Representative Sikes of Florida. The bill would repeal the Norris-Doxey Act and establish in its place a Cooperative Forest Management Act under which the states, with federal assistance, would provide technical services to private landowners and to processors of forest products. The bill carries the same authorization, $2,500,000 as does the present Norris-Doxey Act, but extends the activities to non-farm land, and places responsibility for direct administration under the state forestry agencies.

A bill for Alaska statehood, H.R. 331, was passed by the House on March 3. Under the provisions of the bill, the federal government would retain jurisdiction over the national forests in Alaska.

Senator Murray of Montana, and Representatives Bosone of Utah, Douglas of California, and Blatnik of Minnesota, have introduced bills, S.3144, H.R.7462, H.R.7463, and H.R.7523, respectively to reestablish a Civilian Conservation Corps for the purpose of conserving natural resources and the development of human resources. It proposes a program for 500,000 boys from 17 to 23 years of age, without military supervision. Enrollees would receive $60 a month, at a cost of around $2,000 per enrollee per year, including housing, supervision, training, etc. Unemployment is cited as a supporting factor.

Fred W. Foxworthy (1878-1950)

Fred William Foxworthy, noted botanist and research associate at the University of California, died of a heart attack on February 4, in Piedmont, Calif.

Dr. Foxworthy had spent a total of 30 years as a scientific explorer in Borneo, as wood technician for the Philippines Bureau of Forestry, and as forest research officer for the Federated Malay States. During World War II he served in Washington, D.C. as consultant to the Army on vegetative types of the South Pacific islands. Since 1937, he had been research associate in botany at the Universtiy of California.

A native of Goodland, Ind. Dr. Foxworthy took his undergraduate science degree at DePauw University, and his master's and doctorate at Cornell. He was a member of many scientific organizations including the Society of American Foresters.

Smokey Bear, Goes To The Comics

A four-color comic book, *Forest Fire, A True Story of Our Forests*, produced by the American Forestry Association features Smokey, the celebrated fire preventing bear as he relates to his animal friends the story of forest fire destruction, and explains what people can do to prevent fires.

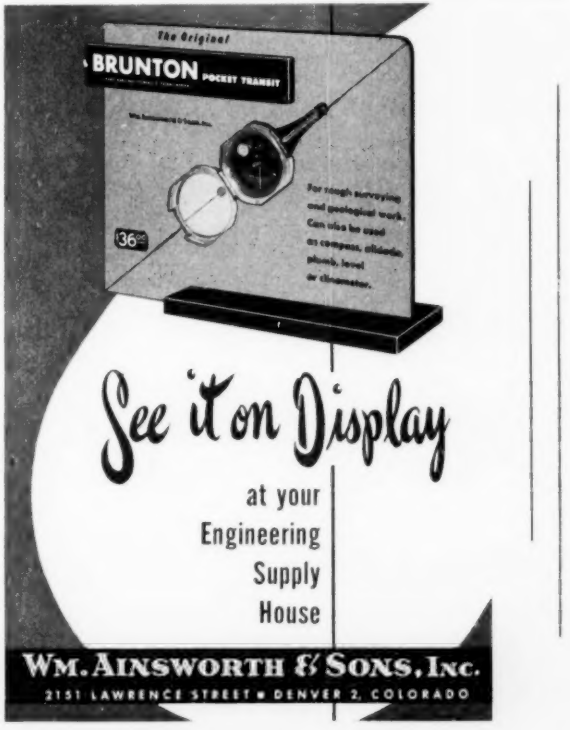
It is a 16-page book with over 50 fast-moving cartoon strip panels, and is available in bulk quantities at a nominal charge. Space is provided on the back cover for the imprint of the distributing firm or agency.

Sample copies of the booklet and price lists will be furnished by the American Forestry Association, Washington 6, D.C.

Blaine Betenson (1897-1949)

Blaine Betenson, who had been appointed director of range reseeding and range improvements in the Intermountain Region, U. S. Forest Service on last December 1 passed away on December 24, 1949. He entered the Forest Service in 1920 and was successively advanced in that organization during his nearly 30 years of service.

Among other achievements, Mr. Betenson succeeded in converting large areas of Utah sagebrush lands to grass, attracting the interest of livestock operators and land administrators throughout the West.



Seedling Production May Reforest Half Million Acres

The United States last year produced enough tree seedlings to reforest more than a third of a million acres of timberland. This year the figure may go up to half a million acres, according to a survey of all federal, state and private nurseries in the country made by J. C. McClellan, chief forester for American Forest Products Industries, Inc., Washington, D.C.

More than 380 million seedlings were produced in the nation's nurseries in 1949. Nursery estimates call for a production of more than 500 million seedlings for 1950, enough trees to reforest half a million acres.

"Assuming a two-thirds survival rate, last year's seedlings crop of 380 million trees will in half a century supply the country's wood needs for a year," McClellan said.

The country's top seedling producer was Louisiana which turned out 53.5 million trees, 14 percent of the rational output. Industry-owned nurseries contributed nearly as much to this Louisiana total as did state-owned nurseries.

Next 12 states in approximate order of 1949 seedling production were: South Carolina, 32 million; Georgia, 27 million; Florida, 25 million; Alabama, 21 million; Tennessee, 21 million; Wisconsin, 21 million; Michigan, 21 million; New York, 20 million, Texas, 15 million; Washington, 10 million; Mississippi, 9 million; Nebraska, 8 million.

Yours is the Land, New Film

Man's misuse of natural resources of our earth, is the theme of *Yours Is The Land*, a new 20-minute, 16 millimeter, color film on conservation, just released by Encyclopaedia Britannica Films, Wilmette, Ill.

Through color photography it presents facts about erosion, forest fires and hunger, showing how the balance of nature keeps in harmony topsoil, plants, forests, animal life and water sources, and how man has upset this balance.

Planned especially for use by film forum groups, the film covers the same subject matter as the *Living Forest* series of classroom films, three one-reel color films entitled *The Forest Grows, The Forest Produces, and Forest Conservation.*

John Storer, world-famed wild-life cameraman, traveled 12,000 miles to photograph this film for its producers, the Conservation Foundation and the New York Zoological Society.

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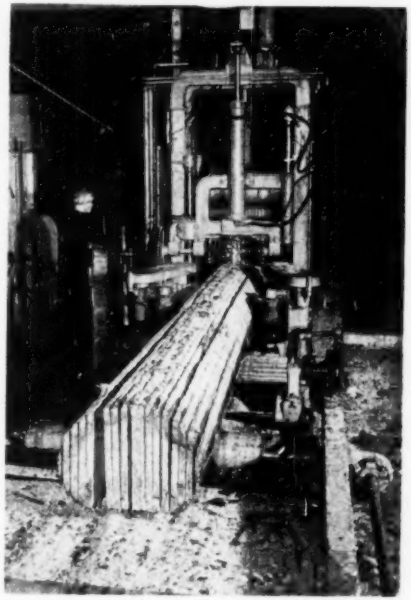

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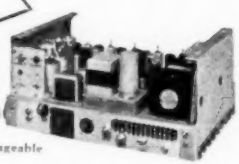

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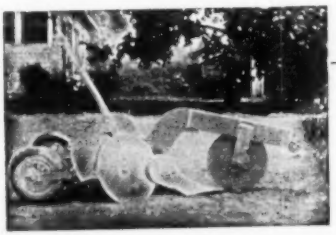

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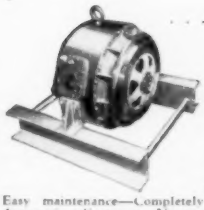

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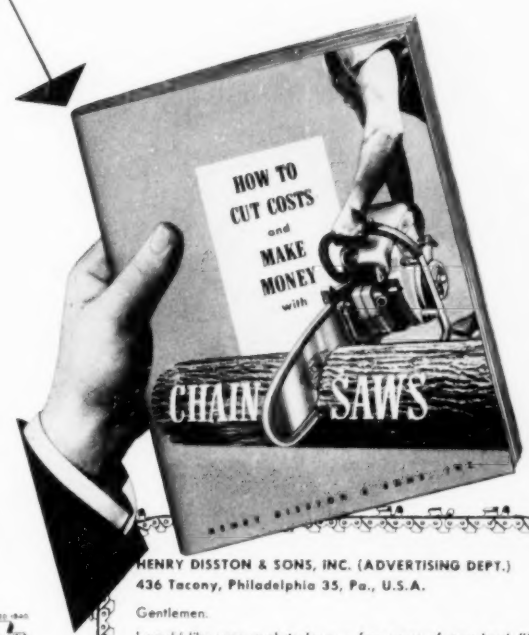

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